BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

Vol. XXI **1889** **No. 2**

THE HAWAIIAN ISLANDS,

THEIR GEOGRAPHY, THEIR VOLCANOES, AND THEIR PEOPLE.

BY

TITUS MUNSON COAN, M.D.

The Hawaiian Islands were discovered in the year 1542 by the Spanish navigator Juan Gaetano. Traces of this early visit may be found in a Spanish map of the sixteenth century which indicates the place of the islands, though somewhat incorrectly as to their longitude; and also in the lighter complexion and hair of some of the natives, which seem to indicate the crossing of their ancestors with European blood. Since the re-discovery of the group by Captain Cook in 1778 it has been generally known as the Sandwich Islands, a name conferred upon them by Captain Cook, in compliment to the British Lord of the Admiralty at the time. The Islanders themselves called their country *Hawaii* (Hä-vī-ē) from the name of the principal island, the *W* noting a sound more nearly akin to that of *V*. The native name is thought by Fornander to be cognate with Java, and to indicate an early residence of the race in the East Indies. From

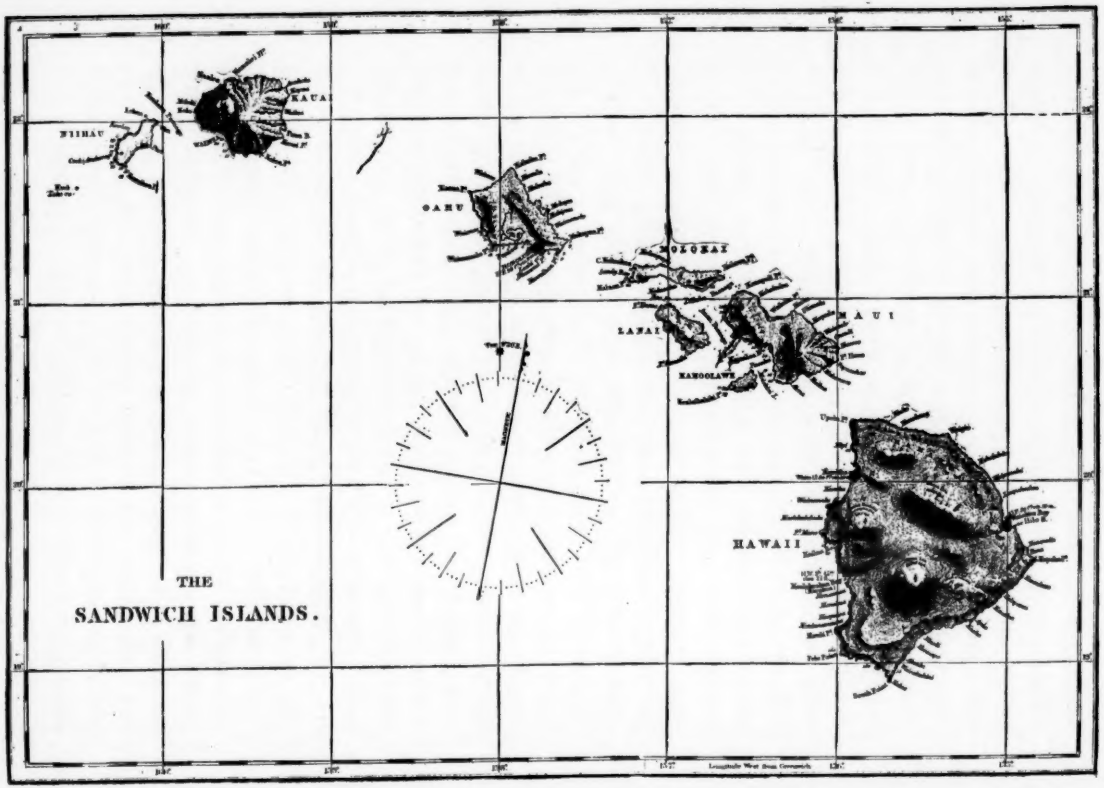
DIAMOND PT. OAHU, HAWAIIAN ISLANDS.

Hawaii comes our English-formed adjective *Hawaiian*, used to designate the group.

Where are these islands situated? Not in the South Pacific, as is thought by many who have not searched for them upon the map, but in the central Northern Pacific, close upon the tropic of Cancer, and about one-third of the distance on a great circle drawn south-westward from San Francisco to New Guinea. They are the most northerly of the dozen groups that are the habitat of the true Polynesian race. Their area is about 6,100 square miles; two-thirds of this are included in the principal island of Hawaii, which has about the same area as the State of Connecticut. Twelve islands are usually named as composing the group: four larger and four smaller, all inhabited, and four barren rocks; but besides these a string of scattered rocks and reefs extends far to the north-west of the group properly so-called. The islands occupy the segment of a circle convex towards the north-east, its chord having a length of about 400 statute miles. (Dutton.)

From San Francisco the distance to Honolulu, the capital, is about 2,100 miles; the Pacific Mail steamers make the trip in seven days, so that the islands are now within less than a fortnight's journey from the city of New York.

Except for the coral reefs that are found among them, the group is entirely of volcanic formation. The islands appear to have been thrown up in successive order from the north-west to the south-east, the most ancient of the group being Kauai, upon which volcanic action ceased many centuries ago. Upon the next large island, Oahu, the soil is usually less deep and the erosion of the craters is


KAUAI
NIIHAU
OAHU
MOLOKAI
LANAI
MAUI
KAHOOLAWE
HAWAII
THE
SANDWICH ISLANDS.

not so marked. Honolulu, the capital, a beautiful town of 20,000 inhabitants, is situated upon this island of Oahu. On Maui, the next island toward the south-east, the signs of volcanic action are more recent; and here we find Haleakala, the greatest extinct crater in the world, a vast V-shaped chasm some eight miles in length and twenty-five or thirty in circuit. On this island the traces of volcanic action are comparatively recent; yet no tradition exists among the natives of any eruption.

Coming farther to the south-east, the terminal member of this chain of islands, Hawaii, has the greatest active volcanoes in the world. The summit crater, Moku-a-weo-weo, and the lateral crater, Kilauea, upon the flanks of the mountain, Mauna Loa, are familiar to my readers as the sources of the mighty eruptions which at varying intervals burst forth and at once devastate and create the land. Hawaii is an island still in process of formation; and Mauna Loa has made its present altitude of 13,760 feet entirely by the successive flows of enormous streams of extremely liquid lavas. The neighboring mountain, Mauna Kea, is a vast mass of long-extinct craters, of which the highest point surpasses the elevation of Mauna Loa, rising to the height of 13,953 feet; but the mass of the mountain is less than that of Mauna Loa, its base being smaller and its slopes less gentle. The island of Hawaii is built upon the ocean floor at a depth of about 18,000 feet, its submarine slopes corresponding closely to the subaërial; its mountains thus rise not far from 30,000 feet above the ocean floor. The mass of these volcanic domes is unequaled. Professor Dana estimates the bulk of Mauna Loa above the sea-level as not less than 125 times the

bulk of Vesuvius; and owing to the immense extent of its base, its mass is greatly in excess even of the much higher volcanic cones of South America. The mass of Mount Ætna, Shasta, Ranier and Hood together, would be inferior to that of Mauna Loa, which is the largest of active volcanic mountains in the world.

The eruptions of this great mountain are unparalleled, at least in historic times, both as to duration and as to magnitude. There have been greater single catastrophes, notably that of Krakatoa in 1883, when it is estimated that a cubic mile of mountain was hurled into the air, and an air-wave caused by the convulsion, as indicated by self-registering barometers at scores of different stations, was transferred three times around the entire circumference of the earth within eleven days.

The eruptions of Kilauea and of the terminal crater of Mauna Loa, are on a not inferior scale, but their action is less catastrophic. Instead of a succession of mighty outbursts, the torrent of lava forces its way continuously through the mountain side, accompanied, indeed, by earthquakes, but earthquakes that are seldom of a destructive character; and from its point of emergence the stream of fusion flows more or less rapidly seaward as the slope of land is less or greater. These eruptions and streams of liquid lava sometimes continue incessantly for more than a year; that of 1855–6 lasted fifteen months, flowing over a course of fifty miles in length, and disgorging an amount of lava nearly equal to the entire bulk of Vesuvius.

The character of the lavas is complex; they are composed of silica and alumina, with oxides and earthy bases. Silica is by far the largest constituent; next

comes alumina. Two earths are found in these lavas, lime and magnesia; and two alkalies, soda and potash. The lavas fall naturally into two classes, in respect to their composition; in the first, or acid group, there is much silica; the second, or basic group contains more alkalies and earthy bases, and the lavas are very fusible. The lava of Kilauea is so fluid that it sticks like molasses, and even splashes like water. Many hundred square miles of the Island of Hawaii are overspread with recent lavas of this description.

The method of progression of these lava-streams is interesting and peculiar. Breaking out, as they do, at the point of least resistance in the mountain-side, often at a vast elevation above sea-level, the white-hot fusion pours down seaward at first at a tremendous rate of speed, flowing under a solidified crust or vault of partly-cooled lava like a river under ice, and sometimes at the pace of thirty miles an hour. But when the stream reaches the gentler slopes of the mountain, its speed slackens; and finally, as it spreads itself out upon the vast reaches of nearly level ground either between the mountains or toward the sea, its progress is checked, and is no longer continuous, but halting, for the stiff inclosing crust of cooled lava that encases it now opposes a check to its progress.

"The lavas below," says that veteran observer, Titus Coan, "are sealed within a rigid crust that confines them on every side. Their onward progress is thus checked for hours or days. But as the tremendous pressure of the stream behind increases the crust is rent, and the liquid lava bursts out and gushes forward or laterally for a hundred, five hundred, or a

thousand feet or more, as the case may be. The surface of this extended mass cools and stiffens in turn, again confining the living lava. Then, with new pressure from behind, there is a fresh rupture in the confining shell. . . . Thus overcoming all obstacles, the fusion is kept under cover, and moves forward or laterally in its own ducts for an indefinite distance." (*Life in Hawaii*, N. Y., 1882, p. 333.) It is a process which I have often watched in the uplands of Hawaii. The force is supplied from the mountain fissure, whence the ever-pouring stream of lava produces a growing pressure at every point of resistance; finally the crust breaks with a crash and roar, and a mass of red-hot lava is poured forth and rushes forward for yards or rods or furlongs. This presently forms for itself another enclosing crust, and the progress of the stream is checked again only to burst forth once more in obedience to new pressure. Thus little by little the stream gains mile after mile upon the level ground; thus its terminal point, many miles from the fountain-head, may continue to advance after the fountain has ceased to play, by means of the mere gravity of the fluid lavas in the covered ducts; and the same *vis a tergo* may even force a "belch" of lava upward and over an elevation under these strange dynamic conditions.

Of course any attempt to divert, modify or check the course of the lava streams is entirely futile. I remember that a Chinese merchant in the town of Hilo, on hearing of the approach of a lava stream from Mauna Loa, complained that the natives showed no enterprise in the management of eruptions. "In China," he continued, "we should have had that flow ditched and brought

down to the sea long before now, and sold admissions to see the flow at four cents a head."

When the great eruption of 1881 was within a mile of the seashore, and threatened to destroy the town of Hilo, and seasons of fasting and prayer had proved of no avail, a deputation of pagan worshippers went quietly by night to the foot of the stream, made their sacrifices to the goddess Pele, the divinity of the volcano, and departed. The eruption, which had been flowing for nine months, stopped on the afternoon of the next day.

These great outpourings produce two main varieties of lava, considered as to its outward form. One is called the *pahoihoi*, or satin lava; the other is the *aa*, or clinkers. The first form is produced by the flow of very fluid lava over a nearly level surface, leaving a crust as already described; its surface is shining and vitreous, and it spreads itself, in vast contorted masses, over miles and miles of country, its vesicular surface glittering in the sunlight with all the colors of the prism, while its general hue is gray. The second form, the *aa* or clinker lava, is produced by pressure from behind forcing forward the lava current when it is no longer fluid, but is cooled to a degree of viscidity that checks its motion. The most tremendous strain is thus set up in the substance of the lava, and the result is a degree of shattering, torsion, and fracture, which leaves the cooling stream in a state of frightful brokenness and jaggedness. It is as if the drinking-goblets of a million Titans had been shattered and flung down upon the world in colossal fragments of jagged black glass. Walking is impossible over such a surface as this, or if at all practicable it is only at the expense of ruined

shoes, stumblings, and bleeding hands; though in course of time a trail even over these savage wastes is gradually formed where the need exists.

I have spoken of these streams of lava as bringing destruction in their path. Of course nothing can resist their progress. Whatever cultivation or handiwork of man is in their way is instantly destroyed. Worse than this, the ancient forests and not these only, but the more permanent features of nature herself are obliterated by these vast and resistless torrents. Though the lava on occasion will climb a hill, as I have said, it naturally prefers the valleys, and from these it not only drives off the rivers in clouds of steam, but it fills the valleys to the level of the land around them, and wherever it moves it leaves a gray and fuming surface in place of profuse fertility.

But these streams of lava are creative as well as destructive; they bring from the depths of the earth the materials of new fertility. The lavas are rapidly decomposed, at least under a rain-fall. Where the climate is perfectly dry, they may lie for twenty or thirty years and seem as fresh as if outpoured the day before; but rain acts rapidly upon them. I have seen sweet potatoes growing luxuriantly in crevices of a stream of lava which was still smoking, or rather steaming. Finding a place where the fresh lava is sufficiently cool, the natives pulverize it roughly, add a few handfuls of dead grass for a foothold, and in this plant the sweet potato. Under warmth and moisture it germinates rapidly, and in due time produces an enormous tuber which moulds itself into the crevices of the lava, and attains a delicious flavor. I may mention that more than one hundred

varieties of sweet potato are claimed as indigenous to the group.

The soil is entirely composed of decomposed lavas and vegetable alluvium. It is everywhere rich, and in some places deep and extremely fertile. The chief tropical productions are grown with facility: coffee, bananas, rice, cocoanuts, breadfruits, oranges, sweet potatoes, yams, cotton, and tobacco. But the great product of the country hitherto is sugar. No other country in the world gives such a record of sugar productivity to a given area as Hawaii. A yield of three or four tons to the acre, which in other sugar-producing countries is considered phenomenal, is here no more than the average; while five, six, or even seven tons to the acre is not uncommon. In Hawaii sugar is king thus far, and is likely to remain so; but in the case of his dethronement the other tropical products already named will find a profitable development in a favoring soil and climate.

The climate is healthful and extremely equable. There is no word in the Hawaiian language to express the idea of weather. At Honolulu the mean temperature is 75° Fahr., and the daily range seldom over 15°. The extremes of temperature in the shade are 53° and 90°. The excessive heats of our American summers are never known; and in this respect the islands are favored above any other of all the tropics. Nowhere in the world is there another warm climate of the same equability which is free from excessive heat; even among other groups of the Pacific these islands are peculiar in this respect.

What is the cause of this climatic fortune? It has been explained by the Rev. Sereno Bishop, using the

"Challenger" soundings as his data, substantially as follows: In the Atlantic Ocean, the deep cold current from the Arctic and the opposing current from the Antarctic ice flow along the ocean floor until they approach the equator, when they meet, and are thrown up to within 500 fathoms of the surface in a great sheaf or fountain. Thence they return northward and southward upon the surface as heated currents, diffusing tropical temperatures in the course of their flow. In the Pacific a very different course of deep-sea currents exist. Bering's Strait is a narrow and shallow passage, and cuts off the escape of the Arctic waters southward. There is thus no deep-sea current from the north to meet the corresponding cold current from the Antarctic ice and to throw up its mighty, slowly-moving fountain of waters to be warmed under the equatorial sun. On the contrary, the deep-sea flow of ice-cold water from the Antarctic icebergs moves northward upon the floor of the Pacific for 10,000 miles, nearly from pole to pole, until it reaches the great Alaskan and Asiatic barriers, which throw it to the surface, still a cold current. Thence it returns southward upon the surface as a cool current gradually gaining heat, and reaches the Hawaiian Islands at the tropic of Cancer, warmed to about 70° Fahr., a temperature which it holds throughout the year with great constancy. The islands are thus not only bathed in an ocean of mild and equable warmth, but for thousands of miles the northeast trade winds have swept over the same sea at the same temperature. The sea determines the temperature of the air, and the air has thus the most agreeable of tropical temperatures. Siroccos, tornados such as

those which prevail in Samoa, and the withering heats of our American summer are never known. As a consequence of these unique climatic conditions, the white man easily labors all day long through the warmest season. The farmer can engage in his field work from morning until night without exhaustion; and while there may be some diminution of vigor in this warm climate, still it is the most attractive, comfortable and healthy in the tropical world. Alone among tropical islands, the Hawaiian group presents a desirable climate for the white races. It is true that these Islands do not foster the ardent, unresting activity of the United States and of Europe. But a winter spent in the East tones up the fibres of the American resident, and he returns with new vigor to the duties and pleasures of Hawaiian life.

It may be asked why the Hawaiian Islands do not have the hot and moist climate of islands like Cuba in the North Atlantic and Tahiti in the South Pacific? The answer is implied in what I have already said. Cuba and the West Indies generally are heated by the vast northward set of waters directly from the equator, which bring torrid heats and moisture to these islands. Tahiti and all of the South Sea Islands are warmed by the returning surface currents of the Pacific similarly heated, but flowing southward from the equator. In either case the atmosphere is surcharged with the moisture evaporated by the heated ocean, and we have hot, damp climates, due to hot surface currents flowing from the equatorial region. But in the case of the Hawaiian Islands, as nowhere else, the surface current comes from the polar and not from the equatorial region, and when it reaches that favored group it has acquired the perfect temperature for

human comfort. The Hawaiian seas, in a word, are continually replenished from the cool waters of the north. All other tropical islands are laved in the heated seas that flow from the equator; and even the Micronesian Islands, 3,000 miles west of Hawaii, have no mitigation of the torrid heat. The reason is that there the great equatorial surface current, a heated current, has attained its full breadth and force, and cuts off the cooler surface current from the north.

Thus the Arctic barrier determines a climate of exceptional attractiveness.

What race of people inhabit this earthly paradise?

It is more conveniently described as the brown Polynesian race than by any other name. Distinctly allied with the Malay, and by a still remoter descent claimed to come from our Aryan stock, they form a species that possesses distinct and most interesting traits. Their habitat includes twelve groups of islands extending from Hawaii in the North to New Zealand in the South Pacific, and from the Lagoon Islands in the Central Pacific to Easter Island, a few hundred miles from the coast of Peru. This vast expanse of ocean includes a triangle roughly corresponding in extent to the North American continent; and throughout all this area the brown Polynesian is the only aboriginal inhabitant. He occupies twelve groups of islands: Hawaii, Tokelau or Union Islands, the Lagoon or Ellice Islands, the Phœnix Islands, the Tonga or Friendly Islands, the outlying eastern portions of the Fiji group, New Zealand, Tahiti, the Marquesas, the Harvey or Cook's Islands, Paumotu or the Low Archipelago, and Samoa; and a number of isolated islands in addition like Easter Island,

famous for its pre-historic statues and great stone platforms. Throughout this entire area the race, the language, the manners and customs, the arts and the character are essentially one. I have myself embarked at Honolulu, 1,000 miles to the north of the equator, and going ashore at the Harvey Islands, a thousand miles to the south, have conversed without difficulty in the Hawaiian tongue with the natives of the southern group.

A few words as to the language may be not inappropriate here.

It has about sixteen independent sounds, vowel and consonantal. It had no written literature, but was reduced to writing by the first missionaries, 1820–30, with an alphabet of but twelve letters. The ratio of vowels to consonants in the language as spoken is extraordinarily high. In an Italian sentence the ratio of vowels to consonants is nearly as 2 to 3; in Hawaii the ratio is 3 to 2, or more than twice as great. The result is an extremely musical language. The superabundance of vowels is prevented from cloying the ear by a guttural break that separates two contiguous vowels when one of them is reduplicated, as in the word *a-a* used above.

Sometimes the same vowel is repeated three times in the same word; and it is possible to construct a sentence of half a dozen words or more in which there shall be no consonants whatever, as in the following sentence: "*E i oe ia ia e oo ia*," "Speak to him now, that he may learn."

Every syllable must end with a vowel,—a phonetic necessity which gives rise to some very peculiar compromises on the part of the native speaker between his language and the English. The name Smith, for in-

stance, in Hawaiian becomes *Kamika*; the language not possessing the sound of *s*, and a vowel of some sort being necessarily interpolated after each consonant. Such a name as *Armstrong* was absolutely unpronounceable. The natives puzzled themselves over it in vain, and finally called it "Lima ikaika," a literal translation of the name.

The Hawaiians, like other brown Polynesians, were great natural orators, full of eloquence and action when their feelings were roused. Like other original peoples, they were full of poetry also, and cultivated several varieties of this art. Their *meles*, or chanted compositions, recorded their history, their geography and their science. Long lines of ancestral rulers or family names were thus preserved, as in the Homeric chants. Their love-poetry was often touching and beautiful, and it contained real sentiment, though it was not always of the most refined. Marriage existed, but its type was not one that civilized peoples would consider very high. Before marriage, perfect liberty was extended to the youth of either sex alike, and what were known as trial marriages were often made, no thought of impropriety attaching to them. If however a child were the result of such a union, marriage usually followed; but marriage among the Polynesians was not the permanent and sacred thing that it is held to be in civilization. These unions were often, indeed perhaps usually, broken after continuing a certain number of months or years, at the option of either party. Children often naturally suffered from neglect, though not nearly so much so as in the countries less favored by nature. It has been estimated that two weeks' labor in the fields was quite

sufficient to support a Polynesian for a year, and under these conditions, of course, the support of children was a much less serious affair than in the cold climates. The pressure upon population was relieved by infanticide. Some years ago I had the pleasure of a correspondence with Charles Darwin upon this subject, and I pointed out that the female children were more frequently sacrificed than the male. (See Darwin's *Descent of Man*, Am. ed., pp. 187, 188, 191.) The newborn children were most frequently the victims; but when their lives were spared for a certain time, the natural dictates of feeling usually triumphed, and the life of the little one was saved. There were, however, instances where infanticide was committed when the child was several years old.

In the main, however, the character of the Hawaiians, as of other brown Polynesians, was extremely amiable. They were affectionate, trusting, and generous to a fault. Hospitality was one of their cardinal virtues; it led, indeed, to an abuse of kindness on the part of many; and a class of indolent persons, known as *hoapili-mea-ai*, "food-friends," was developed; naturally they were looked upon with reprobation. Hospitality was sometimes carried to an extent that was blamable, according to our ideas of ethics. For while the bonds of family were held with jealousy in most cases, yet when a distinguished guest arrived, not only the entertainer's house and food were at his service, but even his wife or daughter sometimes formed a part of the entertainment. This generosity was looked upon with much disfavor by the missionaries. But the usual feeling of the Hawaiian toward a woman who resisted the usage was not of ap-

probation because she was virtuous, but of blame because, as they said, she was "stingy."

With the coming of the new civilization much of this has been changed. The Hawaiians retain their amiable traits, but they have been more or less sophisticated by intercourse with the whites, and they are undergoing rapid extinction and amalgamation with other races. The census now gives a population of about 82,000 in the group, and of these only about 35,000 are pure Polynesian. There are some 20,000 Chinese, nearly all males; 8,000 Portuguese, 5,000 Japanese, 9,000 Americans, English and other Europeans, and several thousand half-breeds. The Chinese are esteemed as good husbands by Hawaiian women, being good providers and reasonably faithful. The half-breeds are a bright and active race.

The government is a limited monarchy, intelligently administered by the native king, Kalakaua.

What is the physical type of the pure Hawaiian?

The men are above the average stature and strength, though under civilization the old chieftains, who were of especially fine physical development, have for the most part disappeared. The Polynesians were the tallest and strongest of races that have anywhere been measured, with one exception—the Tehuelche Patagonians of the eastern coast.

The women are of much smaller stature than the men, but beautifully and voluptuously formed. The chief drawback to their beauty is the flattened nose which belongs to all Polynesian tribes. This is supposed by some to result from the custom of the *honi*, or embrace, which consists of rubbing face to face in-

stead of kissing. Kissing, indeed, the Polynesian considers as a mere waste of time and opportunity.

This amiable race is now in the too rapid tide of transformation ; for it must be said that transformation for the brown Polynesian means destruction. As in all the other Polynesian islands, the aborigines are rapidly passing away under the influence of civilization and Christianity.

What is destroying them? It is not disease or wars; it is the result of radically new ways of life, forced upon an amiable and receptive people more rapidly than they can receive it. In a century the Hawaiian has made as much progress from barbarism toward civilization as the Anglo-Saxon made in 2,000 years. But that progress is purchased at the cost of his existence. The single present cause of his extinction has been named by Darwin; it is sterility from changed conditions of life. Few children are born in a family, and of these a large proportion do not survive to maturity. This infertility is the result of the well-meant but fatal experiment that trade and missions have carried out upon this charming people. " The Anglo-Saxon contagion," as Mr. Matthew Arnold has named it, has been especially fatal among every race which has not opposed it. The Polynesian welcomed the trader and the missionary. First he was decimated by foreign diseases, and then he succumbed to the foreign civilization itself. Where Captain Cook numbered 400,000 aboriginal inhabitants, only 35,000 are now left. Another century, and the last of the pure Polynesians will have disappeared, a prey to the " Anglo-Saxon contagion."

THE PORTUGUESE IN THE TRACK OF COLUMBUS.

BY

DR. P. J. J. VALENTINI.

III.

THE CHART.*

The chart, when unfolded for the first time by a connoisseur of ancient cartography, cannot but fill his mind with wonderment and positive surprise.

Used as he has been to the scanty presentations of the New World in the Cosa-chart and in the Ptolemies of 1508 and 1513, the never-dreamt-of revelation is unrolled before his eyes, that the Portuguese, already in the year 1501, were able to draw a map showing the correct outlines of the Eastern and the Western World (as far as then discovered), and encompassing the two Atlantic valleys, North and South—the whole of it a picture, as if taken from a modern chart. A grand and noble production, indeed! It invited little Portugal's fortunate monarch to embrace, with one single glance, the boundaries of the great kingdom, that he and his forefathers had silently conquered for themselves in the mysterious Atlantic during the short space of about sixty years. Lusitania's blue banner, with its five black balls, is perceived floating on the shores of the Eastern, the Northern, and the new Western Continent. It is planted on the western coast of Africa, as well as on that of

*See last page of the Bulletin.

Greenland, Labrador, and Brazil, and it was not without deep significance that the Cape Verde Island of *Santiago* had been chosen as the central point around which King Emanuel's new world moved.

Nothing was spared by the careful cartographer to illustrate his work. To bring land and water into clear relief, the coasts are colored green, but only on their edges, the ocean itself appearing in the color of the paper. The large islands are all painted green, the smaller ones blue, and the smallest are colored red.

Quite in the taste of the time, the interesting localities of the two continents are marked by emblematic pictures. In the remote east of Asia Minor we see the *torre de babilonja*, and over the Adriatic there is a full picture of St. Mark's Place in Venice, with its two famous columns. Moorish North Africa is in a complete state of siege, blockaded throughout with fascine baskets. On the coast of Guinea the *Fort da Mina* forms the centre of some rather droll representations. Negroes are seen dancing around; an immense golden lion across Sierra Leone is holding in its paws the banner of Portugal, while in front of it some green parrots are carrying on a lively conversation, and at a greater distance a company of white cockatoos are engaged in the same way. Brazil, on the other hand, shows as its natural emblem a flock of gaily-colored arras birds, with a background of tall forest trees. The Corte-Real land in the north is studded with an abundance of slender trees for the masts of future fleets.

The chart is of a rather imposing size; it measures 38′ 6″ by 41′ 6″.

The projection is planimetric throughout. The cob-

web lines drawn all over the surface radially converge toward a system of rectangularly distributed centres, each of these being made conspicuous by the effigy of a compass-rose. In this respect the chart must be ranged among the well-known ancient compass charts.* Simultaneously, however, another cartographic feature is met with, this being an intersection of lines drawn across and lengthwise, but not in accordance with our strict system of meridians and parallels. For it will be observed that these cross-lines do not follow one another at distances of measured geographical degrees. Their succession is not marked by numbers, nor was the equatorial line taken as a starting base for their construction. Nevertheless, this delineation, as it stands, was not made without a certain practical purpose. For, upon closer inspection, it will be observed that the perpendiculars are made to pass through the ports and places which, as long nautical experience had shown, lay along the same line from north to south. All these meridians show remarkable correctness as regards the places and ports belonging to the old continents of Europe and Africa, but there are, naturally enough, considerable mistakes in those drawn through the New Continent.†

* On the subject of mediæval compass-charts and navigation consult: *Sophus Ruge*, Ueber Compass und Compasskarten, *Dresden, 1868.—A. Breusing*, Zur Geschichte der Geographie; in *Zeitschrift für Erdkunde, Berlin, 1869, Bana IV., Seite 31–51 and 97–115.—A. Breusing*, Zur Geschichte der Kartographie, in *Zeitschrift der wissenschaftlichen Geographie, Lahr, 1881, Heft 4 und 5, Seite 129–133 and 180–195.—Theobald Fischer*, Ueber ital. Seekarten und Kartographen des Mittelalters, in *Zeitschrift für Erdkunde, Berlin, 1882, Band 17, Seite 20, sqq.—Eugen Gelcich*, Beiträge zur Geschichte des Zeitalters der Entdeckungen, *in Z. f. Erdkunde, Berlin. 1885, Band 20, pag. 280–325.—Ernst Mayer*, Hilfsmittel der Schiffahrtskunde z. Zeit der gr. Länderentdeckungen; in *Mittheilungen aus dem Gebiete des Seewesens, 1879, No. IV.*

† To quote instances: the meridian of Tarragona intersects in the north

This remark, however, cannot be fairly applied to that meridian which in the shape of a broad, blue printed stripe, traverses the chart, and bears the inscription: *Este he o marco dantre castella e portuguall.* "This is the boundary line between Castile and Portugal." In the north it crosses Corte Real's New Foundland, which was discovered in 1464, and re-visited by the son of the former explorer in 1500. In the south the line is seen striking the eastern shores of a large gulf that bears the name *golfo fremosso* (the roaring gulf), while the Castilian banner, planted on the left side of the line, denotes that at this point the limits of the two hostile dominions were supposed to meet. For it was at this place that Vic. Yañez Pinzon, on his return from a southern cruise as far as Cape San Roque, was able to effect a landing on the 2d of February, 1500.*

There is, indeed, no spot to be found on our whole planet better fitted to suit the purpose of a final territorial demarcation. No doubt this *golfo fremosso* on our chart is the mouth of the great *Pará river*, while the neighboring gulf, the *Rio grande*, with the additional

---

Dutch Breda and Bruges (here written Bruyas), in the south African Tunis (tunes)--a mistake of about 1° 33′. The meridian of Salonichi passes African Tolometa, with the mistake of 1° 89″. The Cape Verde Islands are in about 15° north latitude; their parallel passes through the mushroom-shaped peninsula of Paranagua—mistake about 3°. The meridian of Santo Domingo intersects the same peninsula, and the chart shows it passing through the cabo desseado (mouths of the Orinoco and Trinidad Island), an error, therefore, of more than 8°; and so on.

* *In Navarrete*, Col. d. V. Tom. II., Nos. 17 and 18, page 23–35. *Ant. de Herrera*, Dec. 7., Lib. 5, cap. 6, in which the interesting statement is given that Pinzon on this expedition started from the Cape Verde Islands, evidently with the purpose of solving the problem of the *raya*, and authorized to make an anchorage on the Portuguese island, by the Capitulacion de Tordesillas. *Paesi nuovamente ritrovati*, Milan, 1508, Cap. 112. *Petrus Martyr*, ital. Ed. of 1512 and 19, Cap. CXIII.

inscription : *todo este mar he de agua doçe* (this whole sea is of fresh water) stands for the river *Marañon.* Both waters form the mouth of the mighty *Amazon*, the largest river of the whole world, which here empties itself into the ocean to breast another demarcation line of our globe, that of the equator.*

The news that Pinzon had found land still farther east than that reached by Columbus at the Gulf of Paria, and that he had taken formal possession of it, reached the two monarchs on the 30th of September, 1500. At last the opportunity presented itself to settle the vexed question existing between them how to find the dividing line and where to draw it. It must be here remembered that, according to the Pope's Bull, the line was to be found one hundred leagues west of the Azores and the Cape Verde Islands. But the ambassadors of King Joam, when treating with King Ferdinand in Barcelona, had succeeded in inducing him to allow the line to be drawn two hundred and seventy leagues farther to the west, which established it at the distance of three hundred and seventy leagues from the Cape Verde Islands, the treaty being ratified by Castile on the 5th of September, 1494, and by Portugal on the 27th of February, 1495. By this treaty of Tordesillas both kings pledged themselves to equip a joint expedition for this purpose.* But the expedition, so far as we know,

* Read for full information as to the exact spot of Pinzon's landing : *H. H. Smith, Brazil, the Amazons and the Coast*, New York, 1879, Scribner ; *Fr. Silva*, l'Oyapoc et l'Amazon, Tom. II., § 25-30, 25me lecture, pag. 407. On the roaring of the pororoca-wave, read : *Adalbert*, Prinz von Preussen, *Aus meinem Tagebuche*, S. 508, Berlin, Decker, 1847.

† *In Navarrete*, Col. de viajes, Tom. II., pag. 136 : Capitulacion de la particion del mar Oceano, hecha entre los Católicos Reyes Don Fernando y Doña

never started. Disputes arose about the difference between a degree—on the equator—and one in the latitude of the Cape Verde Islands, as well as about the value of a league and that of a degree. Jaime Ferrer,† King Ferdinand's astronomer, allows us to have a glimpse at the confusion that reigned in the minds of navigators. He writes that there are no means of making the pilots understand the astronomical side of the question; that it would be best to let ten pilots sail from the Cape Verde Islands due west, to have them register the distance sailed from six hours to six hours, and after the distance of three hundred and seventy leagues had been run, to take the average. It is beyond doubt that independent efforts must have been made by both nations to settle the matter during the five years from 1495 to 1500. But as in a due west direction there was neither island nor continent on which to plant a banner and establish a permanent and visible boundary short of the distance of six hundred and fifty leagues, at the Leeward Islands of Martinique and la Dominica, no palpable result was reached. Neverthe-

---

Isabel y Don Juan, Rey de Portugal; "que se haga y asigne por el dicho mar Océano una *rraya* o linea derecha de Polo a Polo, ques de Norte a Sur, la qual rraya o linea e señal se haya de dar e dé derecha, como dicho es, à 370 leguas de la Ysla de Cabo Verde para la parte del Poniente, por grados o por otra manera, como mexor e mas presto se pueda dar."

* *Navarrete*, Tom. II., pag. 99. *A. Breusing*, *l. c.*, discusses with great clearness the methods and instruments used by the ancient mariners in calculating the distance sailed: 1, by estimating the force of the wind, *Gissung* (Engl. guessing); 2, by measuring, at any alteration of the course, the angle formed by the *tow-line* and the *keel* and by employing the *tavola de martelojo*, *Strichtafel*, first introduced in the Portuguese marine by Jacopo de Minorca, at the Academy of Sagres, 1432, which *tavola* gave the mariner a practical direction how to couple the two courses of the ship, the direct and the altered one; the further professional instruments being the Amalfitan compass and the hour-glass.

less the positive impression remained on the minds of the Castilian and the Portuguese navigators that land was to be found somewhere at the distance of three hundred and seventy leagues west of the African shores. Columbus on his second and third voyages carried instructions from the King to attend with the utmost diligence to the business of the "raya divisoria." But he did not find time for doing so, his main attention being directed to his colonial affairs in Hispaniola. Pinzon, his rival, watchful to bring himself into prominence, had now succeeded in giving a certain practical turn to the problem. His discovery, indeed, though not due west, was still to the west of the Cape Verde Islands, at a distance which he must have had means for computing as approximative to the stipulated three hundred and seventy leagues, and which, on the other hand, the Portuguese hydrographers must have been ready to accept as at all events the best suitable divisory meridian. For it happened that only ten weeks later than Pinzon (April 21) Cabral had struck Cape San Roque, had taken solemn possession of it in the name of the Crown of Portugal, and had sent a fast cruiser with the important news to Lisbon. His dispatches reached the Court long before Pinzon's return to Palos, and it was but natural King Emanuel should claim that his new possession reached as far to the northwest as Castile had planted her banner, which was at the *cabo desseado* and the Pearl Islands of Columbus's latest discovery. This view, however, must have been abandoned on the arrival of Pinzon, whose claim for an additional tract of land down to the mouth of the Amazon River was prior in date to that supported by the landing of Cabral.

No clear documentary evidence is left as to the discussions that at this stage of the great boundary question were taking place between the two kings. We only know that they personally were on the most friendly terms with each other. Besides, it is a known fact that the meridian of the mouth of the Amazon has, up to this day, remained the dividing line between Brazil and French Guiana. All the controversies that arose between the two bordering nations were only with regard to the actual spot on which Pinzon made his landing. We may still say it was in the spirit of a true and equitable compromise that the two monarchs agreed upon drawing the line at the place mentioned. It runs just midway between *Cabo Deseado* and *Cabo San Roque.**

Was the draughtsman, on the day he traced the chart, informed as to the number of *leguas* that he was to enter on the chart between the Cape Verde Island and the stipulated *marco?* Did he count only 370 *leguas*, or did he make the number accord with the distance as given by the log-book of Vic. Yañez Pinzon? or finally did he pay no attention to the matter, but work out the composition of his oceanic *tableau* as he thought best?

The last view cannot be entertained for a moment, since the chart is provided with a scale graduated in accurate spaces, and, therefore, evidently destined to serve as a key for the distances on the map. We find this scale delineated at the right below, and at the left above the chart, but neither in figures nor in words is the value

* Pinzon gave to this cape the name of *Cabo de Consolacion;* Cabral called it *Cabo S. Agostin*, and our map shows the name *San Yorge* (a misnomer for San Roque?); but this entry evidently was made by a hand different from that of the draughtsman.

of the spaces expressed, such being the bad habit of the ancient cartographers. Were it not for a passage preserved in the contemporary Peter Martyr,* in which the learned councillor of King Ferdinand enters upon a discussion on the merits of La Cosa's chart, we should be without the authentic knowledge that the hydrographer's scale was arranged in spaces, each of these representing 12 *leguas*. On our chart the distance from the island of Santiago to the *marco* measures 35 spaces, and the length is, therefore, 420 *leguas*.

If Peter Martyr's statement is to be rejected as applicable, not to the Portuguese, but to the Spanish scale, the value to be assigned to the spaces on the Portuguese chart may be ascertained by trying the scale on well-known distances in the Mediterranean sea. We find the distance from *Cape Ceuta* to the west cape of Sicily to be 320 *leguas*, and that from Reggio (*Rezo*) to Cerigo (Satrill) 136 *leguas*; added together, these make 456 *leguas*, and give a continuous line, which is equal in length to one measured from the Island of Santiago to the Amazon meridian.

This line extends through 35 spaces of the chart. Each space, therefore, represents about 13 *leguas*, and this rough calculation agrees pretty closely with the figures given by Peter Martyr. It does not appear whether the King of Castile was conscious of having lost 86 *leguas* in longitude east by this agreement. In reality he lost much more; for the true distance comes near to 560 *leguas*. Had Castile firmly insisted upon her origi-

* *Petrus Martyr*, De rebus Oceanicis, Decada V, Cap. 7.—F. A. de Varnhagen, Examen de quelques points de l'hist. géogr. du Brésil, in Bulletin d. l. Soc. de Geogr. 4^{me} Serie, Tome XV, Mars, Paris, 1858.

nal claim of 370 *leguas*, the Portuguese dominion in North America would have been reduced to the small strip of land lying to the eastward of the meridian of Rio de Janeiro.

IV.

THE STELLÆ MARIS.

Let us now pass from this hasty survey of its general features to those which especially belong to *our* chart, and which are not found on any contemporary Spanish chart.

In this direction we note the representation of three naval stations. The one will be found at the Island of *Santiago* (Cape Verde), the second at the island of *Andros* (Bahama Archipelago), and the third on the mushroom-shaped Peninsula of *Paranagua* (Coast of Venezuela). The first is located east of the *raya*, in the Portuguese waters; the two others are in Spanish waters, west of the *raya*.

For the better understanding of what we mean by naval stations, let us say that this chart, as well as all the large marine charts of the epoch, shows on its surface, so to speak, a well devised system of inter-radiation, the radii starting from and crossing through a certain number of central points distributed all over the chart. From each of these central points 32 lines are seen radiating in the direction of the 32 points of the mariner's compass. The central points are represented in two different ways. One kind shows the centre figures arrayed in a perfect square, each of the four corners bearing the effigy of a carefully delineated and colored

compass-rose, also called *stella maris*. These had their location assigned by the hand of the cartographer to arbitrary positions, which served his planimetric purposes, and thus we see these *stellæ maris* on ground and waters never visited nor measured by travellers and mariners. The other centre figures, on the contrary, represented places really existing in nature, and these are conspicuous on the charts by the absence of the compass-rose. They designated the port from which the pilot used to start, the official naval station of his country. If this were explained nowhere else, we might learn it from La Cosa's chart. He drew a plain *stella maris*, without the effigy, near *Palos*, Castile's official seaport, and, another one, of the same kind, near the island *Habacoa*, the *Abaco* of to-day, a place well chosen to serve as a naval outport against ships attempting to slip into the Spanish waters through the Bahama Channel, the shortest route from Lisbon or Madeira. Palos and Habacoa are connected by a line drawn through both centres, thereby showing that the latter island was reached by the "Greco-Levante," or E. N. E. wind. A third *stella* of the same kind, for which, however, we cannot find any historic interpretation, is represented on the west coast of Africa, south of the Bissago island.* These three are the only plain *stellæ maris* to be found on the Spanish chart. All the others stand in square, and bear the effigy as described.

* Both charts show at this place a group of small islands, unnamed, which must be recognized, being the St. Ann Reefs and Sherboro islands of to-day. The Spanish nomenclature along the western coast of Africa, it will be noticed, is widely different from that of the Portuguese, a proof that although forbidden to enter these waters, the Spaniards were as unscrupulous in the non-observance of the treaty of Tordesillas as the Portuguese.

On our chart the *stella maris* of the official naval station is not met with at Lisbon nor at Madeira, as might be expected. The cartographer with great artistic as well as with patriotic tact gave it a far more becoming place, at the Cape Verde Island of Santiago, right in the middle of the great marine picture, and in the centre of the ocean that his king and nation had begun to rule. In any direction from this point, wherever one radius of the compass strikes a coast, it touches land discovered and conquered by Lusitania's courageous pilots.

It was but a short time before that the little island of Santiago had claimed the attention of Portugal, and that it had been found to be a most suitable maritime depot and station for her navy, so eager for distant oceanic explorations. It had been discovered in 1446 by Cadamosto and Anton de Nolle, two cavaliers, to whom Henry the Navigator had granted the permission of making explorations along the coast of Africa. When the Canary Islands had to be surrendered to ambitious Castile, the half-forgotten group of the Cape Verde Islands became the welcome rendezvous of the Portuguese. On their voyages along the scorching shores of Africa, the mariners here found the inestimable advantage of repose, with the opportunity for repairing damages and recruiting their strength. Wherever in the scanty records of that epoch mention is made of the early Portuguese expeditions to the Indies, we read of the admiral's making an anchorage at Santiago.* Its selec-

* See J. de Barros, Decada 1ma da Asia, Lib. 4°, Cap. 2°. Lisboa, 1628. "Bartholomeu Dias. . . . com bom *tẽpo tenerão* em treze dias *forão* ter *á Ilha de Santiago* que he a principal das do Cabo Verde, onde tomarão algum refresco." The

tion as the starting point from which to find the dividing *raya* in the West made it a much sought for centre of daring seamanship as well as of hydrographic speculation.

Considering all the facts and reasons by which our cartographer was prompted to bring the island of Santiago into the graphic relief of a naval station of his country, it is not without a certain degree of surprise that two more such stations are found drawn on the chart in the far west of the Spanish waters, a domain which the Portuguese were peremptorily forbidden to enter. No doubt, an interdiction like this must have been disregarded not only once, but many times and by both parties. No surveillance was possible on the immense expanse of these waters. Both parties knew this very well, and greed as well as mutual hatred ran the risk of capture. There is no record of Spanish prizes brought in by Portuguese, although the latter had a good chance for this if they ever got any knowledge of the Spanish station at the St. Ann-Reefs and the Sherboro Island. But we do read of a very formal complaint lodged with the Crown of Castile in the year 1503, which proves that inroads were made by Portuguese ships into the Caribbean sea, and gives us full insight into the true nature of these un-

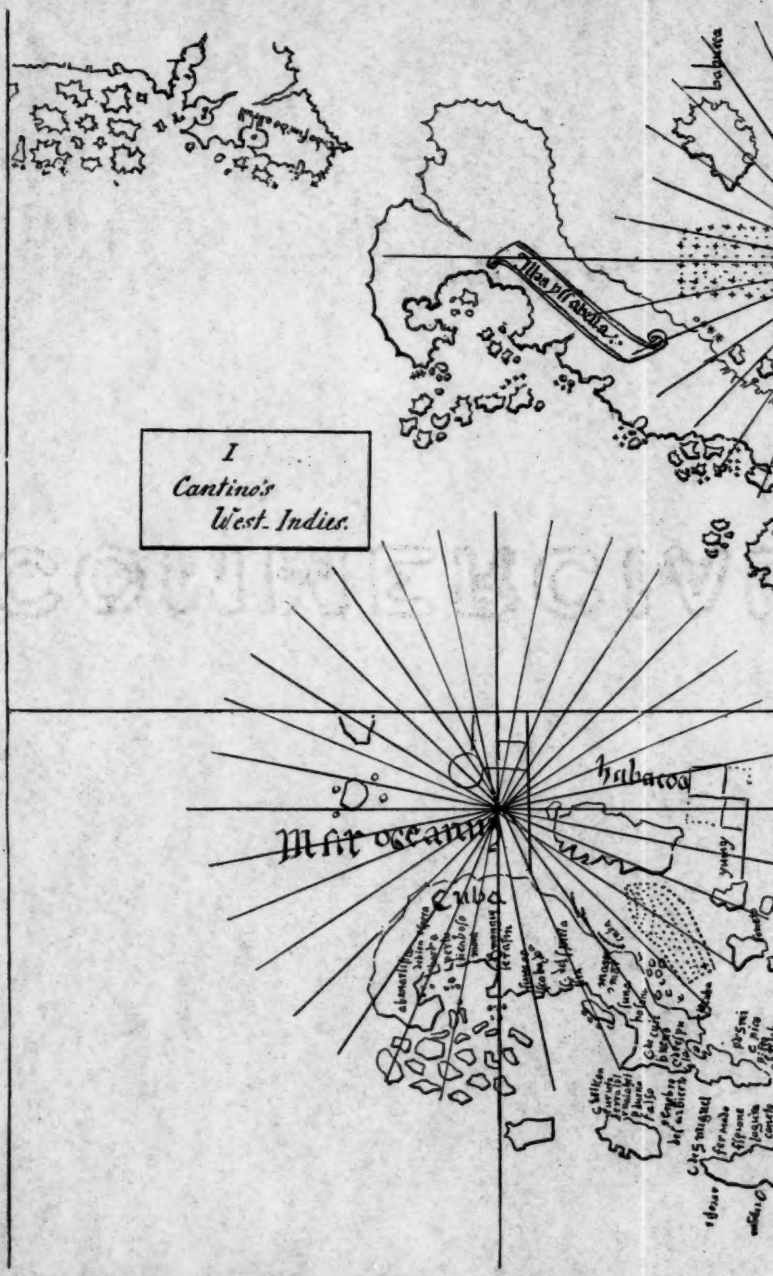
same. Dec. 1, *Lib.* 5°, Cap. 2 (A. 1499) "Pedraluarez com toda a frota fazendo sua viajem às ilhas do Cabo Verde." See also *Hieron. Osorius*, de Rebus Emanuelis Regis gestis, Olyssipone, MDLXXI., pag. 31. "Hoc eodem anno (1499) V° Idus Julii, Emanuel primum nuncium de rebus Indicis auspicio suo exploratis accepit. Quemadmodum gestum sit, est ab initio repetendum. Gama, ubi primum solvit Olyssipone, cursum ad Fortunatas insulas direxit, deinde insulam, quam appellant *Sancti Jacobi*, quae respicit Aethiopiam, lustravit . . . . Pag. 55. "Inde Gama ad insulam *Sancti Jacobi* ventis secundis apulit." Pag. 64. "Interim vero Capralis (Cabral), qui in Indiam navigabat, eundem cursum quem Gama, secutus est, donec ad Insulam Scti Jacobi pervenit."

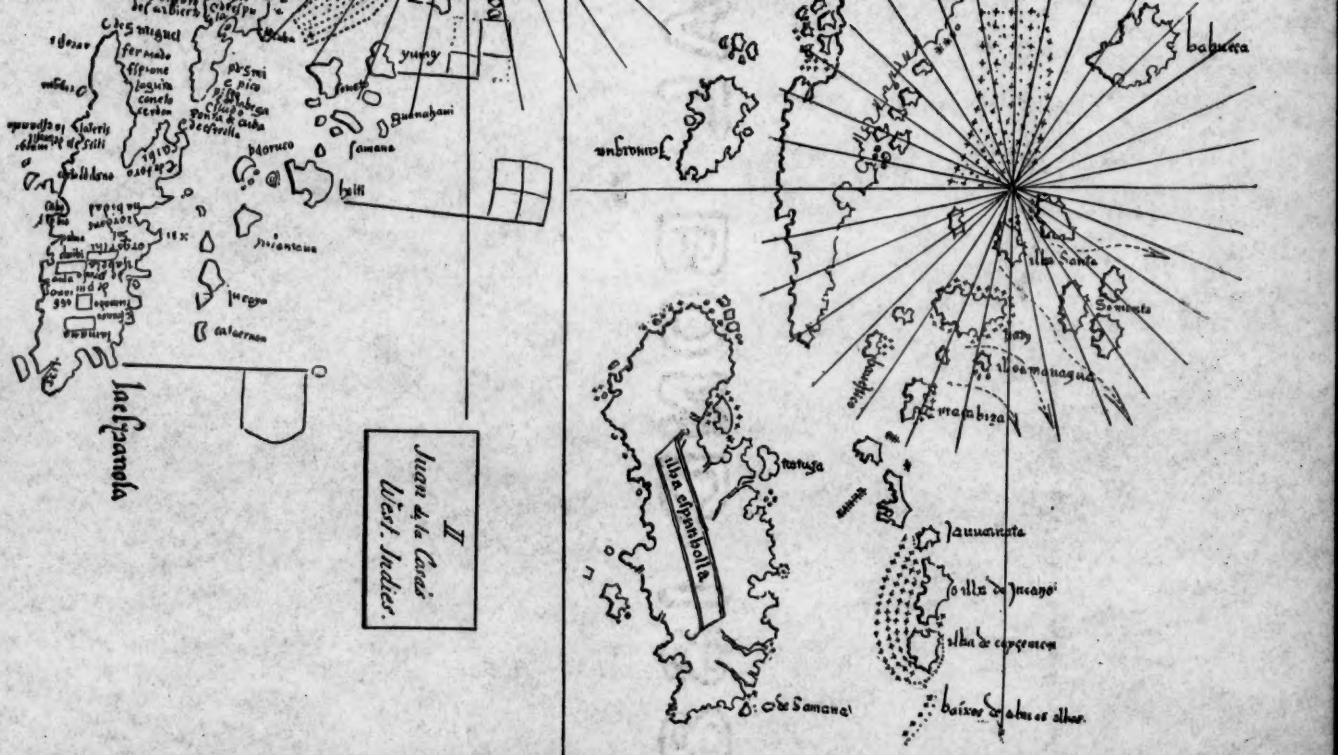
bidden visits.* Rodrigo de Bastidas, the discoverer of the gulf of Darien, who on these shores had some trading interests at stake, writes to the king that Portuguese vessels had made their appearance in these waters, that the crew had cut Brazil-wood on the coast, had plundered the natives and made away with a large cargo of slaves. Therefore, it was not the problem of the dividing meridian alone that lured these vessels into the distant waters, but the lucre resulting from the sale of the precious dye-woods and the human flesh, in the market of Lisbon, a trade besides, to which the Portuguese had been used for long years, and which they now tried to extend, because they could do this without much risk, and at the cost of the national enemy. All these circumstances concur to furnish an explanation why the cartographer felt prompted to draw the Santiago-Paranagua parallel, and to stamp the latter place with the character of a Portuguese sailing-port or naval station. Paranagua, then, belonged to the Bastidas-coast, and it is not without a certain significance that we find drawn on the chart at no great distance an island named Brazil.

North of this same place and at the head of the great Bahama Bank another naval station, the third on the chart, is found.

---

* See *Ramon de la Sagra*, Hist. phys. de Cuba, Vol. II, pag. 448, Apendice, where the renowned historiographer of the Faithful Island brings the following abstract, taken from the Registro de los titulos y de las nominaciones para los empleos de la casa de Contratacion de Sevilla, 1503-1579: "Le 13 Iuillet, 1503, un courrier fut expédié à la cour pour donner avis de ce que l'on savait au sujet des bâtimens portugais, qui ont été à la terre de Bastidas, et en avaient enlevé des esclaves Indiens, et du bois de Brésil. Le 22 Août, 1503: Juan de la Cosa fut envoyé pour avoir des renseignemens sur ce que les Portugais avaient fait avec quatre navires, et sur un autre qu' ils avaient *convenus* envoyer cette année. Et Cosa donne à la Reine à Ségovie deux cartes marines des Indes."


I
Cantino's
West. Indies.
Mar oceanum
Cuba
Habana


Juan de la Cosa
Hizo. Indies.
Isla Española
Jamaica
Isla de Sancto
Isla de Jamaica
Isla de Cayguaca
Isla Española
Tortuga
Isla de Samana
Baixos de abres es albor

It is worth while examining at what particular spot in the Bahama Islands this station was made. It excites our utmost curiosity. We see it placed, audaciously enough, in the very heart of King Ferdinand's newly acquired *insular* dominion, north of the large island of Isabella, and facing a large tract of coast to the west, covered with unknown names, and presenting an outline that corresponds with nothing in that direction. It is the picture of the same coast that appeared in the first editions of the Ptolemy, the one that Ruysch's Ptolemy of 1508 indicated as the last western point touched by King Ferdinand's vessels, a coast however, strange to note, that had remained entirely unknown to Castile's great cartographer La Cosa. Up to the finding of the Cantino chart the identification of this coast has been a puzzle. We believe that clear light may now be had on the subject, and must beseech the reader patiently to follow a comparison between the three maps of the Antillas, that of La Cosa, that of Cantino and the modern map, for which purpose we furnish the adjoining diagrams, 1, 2, 3. The interesting result will be reached thereby, that King Joam II. was far better informed about the distant west than King Ferdinand himself, that the shape and the proportions of the great Antillas are far more correctly represented, and the groups of the Bahama Islands more distinctly discriminated by the Portuguese hydrographers; all this implying on their part much cautious and silent labor, and a long sojourn, as indicated by the entry of the *stella maris* in the Bahama channels.

Let us begin with a comparison between La Cosa's and the modern map of la Española or Haiti. La Cosa

gives Haiti's axis nearly the length of that of Cuba, while it is in reality not quite half as long. The Cantino chart shows the proportions much better taken: Cuba $=1$ and Haiti $=2/3$. On Cantino's outline of Haiti we miss the great western bay with its island of *Gonave*, as also the capes of *Tiburon* and *San Nicolas*, which are pretty well rendered by La Cosa. Such important features would surely not have escaped the Portuguese pilots and hydrographers if they had only dared to show their sails so near the thickly populated Spanish island. Nevertheless, the Portuguese knew of the existence of this bay. We find it drawn on Cantino's map on the north coast with the island of Gonave, whilst on the other hand *Tortuga island*, which is quite forgotten by La Cosa, stands in Cantino in its correct place. All these little points tend to show that the Portuguese hydrographers were in a sense independent of the Spanish surveys. Where the former had no chance to make their own survey, their representation grows defective, where they had free scope they surpass the Spaniards.

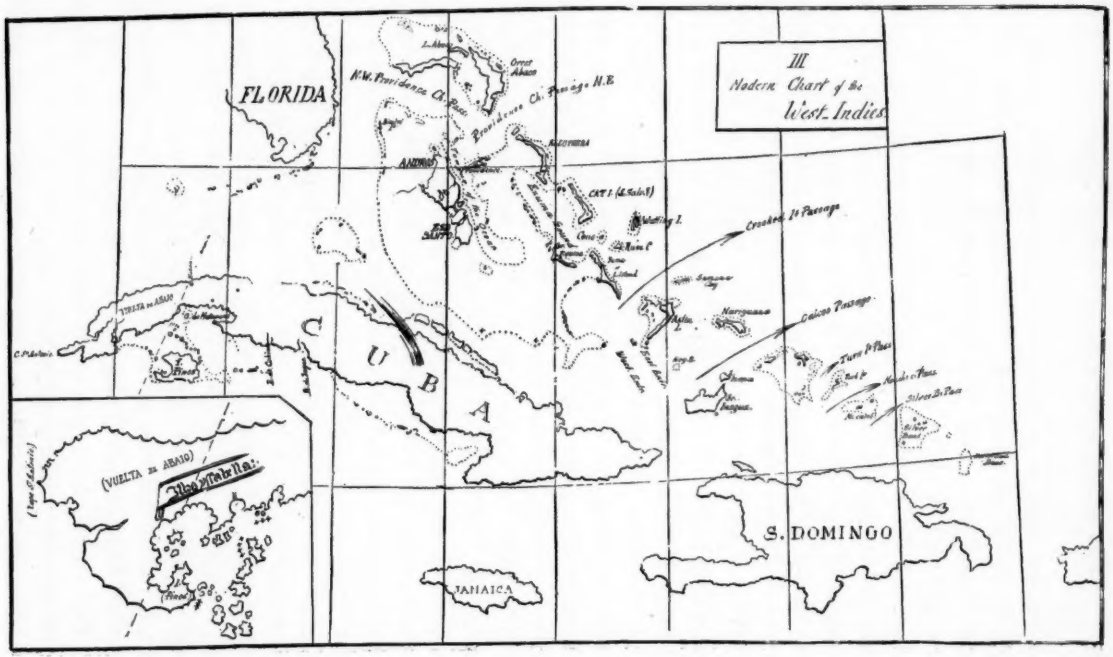
This point will be still more clearly shown when we pass to an examination of Cuba. It will be noticed, at the first glance, that the relative positions of the three islands, Cuba, Haiti and Jamaica, are so correctly represented on our chart that they almost appear to have been taken from a modern survey. La Cosa makes the mistake of pushing the western cape of Haiti far below the eastern end of Cuba, while the two points, in reality, lie due north and south, as they are placed on the Portuguese chart.

One of the most striking proofs, however, that the Portuguese had sound information as to the true dimen-

sions and shape of Cuba will be found by taking a glance at its western end. La Cosa gives to this end of the island the form of a hook bent to the south. Although our modern maps do not show these curving lines, La Cosa's design is still not so unfaithful to nature as it has been judged to be. He undoubtedly imagined the Island of Pines was a continuation of the mainland of Cuba, to which belief he was induced on account of the numberless large and small coral islands that obstruct the channel. The Portuguese chart also shows the same hook-shaped western end, but in addition to it a large peninsular body, which the copyist of the chart, for reasons later to be explained, chose to draw bending towards the north instead of the west, the true direction. It follows that this whole western tract of Cuba, from Havana to Cape San Antonio, which to-day is known to many of our readers by the name of *Vuelta de Abajo*, was still in the year 1500 unknown to its legitimate owners, but known and accurately surveyed by their spying rivals. Whatever mischief these intended to perpetrate, whatever information they wished to gather as to the extent and nature of King Ferdinand's Indian domain in the far west, they were able to work with full knowledge. Cuba, at this epoch, was still a desert. Only its southern coast, as we may learn from La Cosa's chart, had been surveyed, and its harbors and capes provided with names. The whole northwest, accessible from the *Stella maris* by deep waters, lay open at the mercy of the pirate.

But on which of the many Bahama Islands are we to look for their hiding-place?

The answer to this question can only be found after


III
Modern Chart of the
West Indies
FLORIDA
CUBA
JAMAICA
S. DOMINGO
(VUELTA DE ABAJO)
Havana
Matanzas
Cardenas
Trinidad
Cienfuegos
Santiago
Nassau
Crooked Is. Passage
Caicos Passage
Turks Is. Pass
Mouchoir Pass
Silver Bank Pass
Navidad
Isle of Pines

a comparative examination of our three maps. Let us begin with counting on the two ancient maps the islands represented north of Cuba. La Cosa's chart counts 19 islands, of which 10 are provided with names; Cantino exhibits 18, with 11 names, and only five of these names agree in both, those of *habacoa*, *someto*, *haity*, *mariguana*, and *lucayo*, which goes far to show that the Portuguese did not depend entirely on the charts drawn by the Spaniards. We also notice that the former chart exhibits a marked endeavor to bring the grouping of the islands into greater prominence than the chart drawn by La Cosa, and it is just this conspicuous grouping which will make it easier for us to ascertain the identity of the individual islands.

To begin with the uppermost, that of *habacoa*, there is no doubt it stands for the many little insular bodies of which the island of Abaco on the modern chart is composed. Position as well as name confirm the fact.

South-east of Abaco, and separated from it by a broad channel, that of Providence of to-day, we cannot fail to recognize in the three islands east of the meridian of the *stella maris* the thrice-divided Andros group of our modern surveys, in which the island of Espiritu Santo suggests the identification with the *ilha Santa* of our chart.

North-east of this Andros group, and separated by a channel, which probably was intended to represent the large inlet now called the "Tongue of the Ocean," we find another group of three islands, inscribed with the name *Someta*. These suggest to us the islands of Providence, San Salvador, and Eleuthera of our modern maps.

South of these, the large island surrounded by reefs, which bears the name of *haty*, seems to represent the modern Cat Island, the great Exuma, and the girdle of reefs that embosoms what is to-day called the Exuma Sound.

Watling, Rum Cay and Yuma Island may be recognized in what the Portuguese called *ilha managua* (today, Mariguana), and *macabiza* and *bauestico* would represent the Atkin Islands. The Crooked-passage between them and the former is distinctly marked.

Undoubtedly the two next unnamed islands were meant to represent the modern Caicos group with its additional southern bank, Turks passage on the right being left open.

Then follows Turks-island, named *Janucanata*, Mouchoir carré or *ilha de lucayo*, Silver bank or *Caycemen*, and in the *baixos de abre los olhos* we are justified in recognizing the perilous reefs of *la Navidad*.

As to the great Bahama Bank, it is pretty correctly represented in La Cosa's as well as in our chart, inasmuch as in both its southern edge is made parallel with the north coast of Cuba.

In both ancient charts, finally, we meet with a *stella maris* north of the island of Cuba. There will be noticed however a palpable difference in regard to their location. La Cosa puts his *stella maris* far to the west of the Bahama Bank and Abaco, at the entrance of the Florida channel, whilst in our chart the location of the *stella maris* is to the east of the Bahama Bank and in the vicinity of what we have recognized as the Andros island, the two stations being separated therefore by a distance

of about 160 miles. The position of the Spaniard in this channel, as already mentioned, was well chosen. It must have been destined to protect this entrance against the much dreaded inroads of foreign vessels, because it could not be supposed that they would choose their passage through the much frequented southern channels of the little Leeward Islands, since these had become the customary lines of Spanish traffic between Palos and the harbors of La Española. It is only surprising that with this channel station so near the coast of Florida, that peninsula was not discovered before the year 1514.

On the other hand, this Portuguese station near Andros Island suggests some interesting reflections. The whole Bahama archipelago might be vainly searched to find a hiding-place better adapted to piratic enterprise than the one Andros offers. It stands at the front of the other large oceanic channel, that of Providence, thus affording a wide outlook to the open sea. At its back is a basin of deep water, the so-called "Tongue of the Ocean," girdled by a circular string of countless banks and islets, through the channels of which the expert may seek entrance or slip out on any emergency. Andros, moreover, is the only place in the Bahamas that has a creek of fresh water to supply a fleet with this necessary of life and keep it anchored during all seasons. History informs us how long and how successfully this very place served as an unapproachable resort and unconquerable bulwark to the pirates of all nations. Not until 1718 did the British and their Captain Wood Rogers succeed in making an end to the mischief by taking possession of Providence Island and building Fort Nassau. Inci-

dentally it may also be remarked here that Christopher Columbus, on his first voyage, if he had persevered in his initial strictly western course, would have sailed right into the mouth of the Providence channel. But it happened that when upon the 7th of October, 1492, no land had been descried by his impatient crew, Columbus had been forced to yield to the entreaties of Alonso Pinzon, and to change his course to the south-west, so as to lose himself in the labyrinthine reefs and banks encompassing Exuma and Long Island. Therefore, if King Joam and his courtiers listened, as we have every reason to believe they did, with the utmost attention to Columbus's narrative, and especially noted his forced change of course toward the south, because this new course implied a violation of the ancient demarcation line, and if furthermore, as we know, the king secretly dispatched the four caravels to discover the track of Columbus, it almost seems as if, cautioned by his sad experiences and dangers run in the labyrinth of the Long Island and Exuma shoals, the caravels had steadily kept his original western course and thus by entering the Providence channel, had seen Andros heaving out her broad shoulders in the blue horizon. What better could they do than rest at such a place, their first landfall after crossing the wide ocean! Columbus's boasted secret was now in their possession. They must have been pretty busy later on in trying to identify the other islands, to which Columbus had given the names of Concepcion, Juana, Fernandina and so on. They must have remembered the name of a certain fort *Isabella*, which he had built on the southern shore of the large island of *haty*, where he had left his brother Bartholomew with a small garrison. Now,

south-west of Andros the Portuguese had reached, as was pointed out above, a large island, that of Cuba. It was the only island that they could meet with after leaving Andros for a farther western cruise. Very likely they took it for Columbus's *haty*, and in their first bewilderment they put it on their sailing chart with the name of *Ysabella.*

Islands are but monitors of a not distant continent. The old Portuguese salts knew this from their Mediterranean and African experiences. If they were now bent upon paying a visit to Columbus's Indies, they had no other choice than to keep their prow turned toward the west. Onward they sailed. The western end of Cuba, the Cape of San Antonio, came in sight. Survey and information taken on the spot proved that it was part of an island; but they were in search of a continent. The natives must have repeated to them the story that had been told to Columbus, but which he had disregarded—that "with one day's gentle breeze a continent could be reached, inhabited by people wearing clothes down to knee and ankle, and many of them as pompously attired as the chaplain of the foreign vessel when he was reading mass." *

* We find Columbus oftentimes reproached for not having pushed farther to the west on his first and second voyages to the island of Cuba, and for having delayed in this way the discovery of the shores of Central America. The reproach is unjust. On both occasions his ships were in a most dilapidated condition, his provisions at an end, and the crew were unwilling to risk their lives in any farther adventurous expedition. See *Historie del Sig. Don Fernando Colombo*, Milano, 1614, Cap. LVII., pag. 232. "Et a' 7. di Luglio dismontó (Colombo) ad udir Messa in terra, dove gli si accostó un Cacique vecchio, Signor di quella Provincia, it quale stette molto attento alla Messa . . . et fra le altre cose disse, che egli era stato nell' Isola Spagnuola, et vi conosceva de' principali huomini: si como anco in Giamaica: et che era andato molto verse *l'Occidente di Cuba*, et che il Cacique di quella parte *vestiva come Sacerdote.*" Expressed in other words but of very like

The coast they found in this direction is drawn in our chart, like a barrier stretching from south to north. It is inscribed with twenty-one names, most of them only such as sailors use to give, but all of them in the Portuguese language.

There is no coast of this configuration directly opposite to the Cuban cape of San Antonio. What section of the American continent this coast was intended to represent in the maps of the Ptolemies and of Schoener, as well as in this recently discovered Cantino map, is a question that has so far remained without an answer.

Let us approach this subject by first examining the names.

V.

THE NAMES INSCRIBED ON THE COAST.

Upon approaching the discussion of this subject, it will be convenient to the reader to have before his eyes the three pictures of this portion of the New World, published in Europe, in the successive years of 1508, 1513 and 1520. They are represented in the diagrams Nos. 2, 3 and 4, No. 1 giving Cantino's chart. The reading of the names, as they are inscribed on this chart will first occupy us.

They were written unquestionably by the hand that drew the whole chart. This happy circumstance enables us to determine by means of comparison the identity of

tenor are the reports given of the same subject by *Andrez Bernaldez*, the Cura d. l. Palacios, who gathered them from Columbus's own lips. See the translation of his *Historia d. l. Reyes Católicos* in Collection of the Massachusetts Historical Society, Vol. VIII., 3d Series, pages 6–68.

any letter, in case of doubt as to the interpretation of its alphabetic value.

The letters are written in the cursive Gothic alphabet, commonly employed, at this epoch, by all the calligraphers of southern Europe. They are the work of an experienced and steady hand, and are cut so clearly as to give the impression of being printed rather than drawn with the pen.

The names inscribed upon the coasts of the two old continents follow each other in such close succession that the draughtsman, for the relief of the reader's eye, occasionally changes from a black to red lettering. On the New Continent the names of Portuguese Brazil are all written in red, those of the Spanish portion, the discoveries of Columbus and Bastidas in black, the Antillas again in red, and the names of the coast unknown to us all in black. All of them without exception are inscribed upon the land; a very judicious arrangement, because the eye of the reader, in this way, gets a clear impression of the outlines of the coast.

The idiom employed is the Portuguese, though here and there, and mainly with the articles, Spanish and Italian forms appear to be intermixed.

Beginning our examination with the south of the unknown coast, we meet with the names:

1. *Rio de las palmas.*—The reading of it, as well as the translation, "river of the palms" (Palm river) gives no matter for discussion.

2. *Rio do corno.*—The letter *n* in *corno* is so clearly expressed, as not to admit any change into a conjectural *u* or a *v*. The translation, therefore, will be: *Horn river*, a river that, like many others, showed

an alluvial horn or curve at its *debouchure* into the ocean.

3. *C:. arlear.*—The abbreviation of Cabo, or cape, as made with three points, is typical on this chart. It will be observed at other similar places. The word *arlear*, in the mariner's language of that time, signifies to strike sails, the correct form for it being in the Portuguese language *arrear*.

4. *C:. do lurcor.*—Must be read *lurcar*, and in better form *lucrar*, the use of the metatheses of this kind being very common in Spanish and Portuguese vulgar speech. *Lucrar* means to gain, to make a lucre. It corresponds to the Spanish *rescatar*, to barter on foreign coasts. Hence, *the cape of barter*.

5. *C:. do mortinbo.*—By the simple change of the letter *b* into an *h*, the word would give a sense, and might be translated by *Cape of myrtle-seed.*

The *myrtaceae*, however, do not grow on tropical coasts; they only thrive at an elevation of about 6000 feet above the sea. We, therefore, think the word must be read *Martinho*, a proper name appearing in various forms, as: *Martin, Martim, Martimho.* A port of Portugal opposite the Berlengas Islands bears the name: *concha de San Martinho*, and on other maps *Mortinho.* Thus we translate: *Martin's-cape.*

6. *Cabo:. lurcar.*—This time the letter *a* is clearly expressed, and the repeated occurrence of the name will not surprise, when we consider that the chief interest of the trading mariner was to note the places at which he had the opportunity of bartering with the natives.

7. *El golfo baxo.*—To be translated: *the deep gulf*, a name very appropriate for this deep twin gulf, by the

side of which it stands written. The left cross-stroke of the *x* does not appear in full continuation, its end showing distinctly beneath the preceding letter *a*. Compare No. 12, where a like break of the left cross-stroke of the letter *x* is found in a word, for which there is no other reading than *roixa, red.*

8. *C:. do fim de abrill.*—The dot over the *i* in *abrill* is not quite clearly marked, and the word might be read *abrell*, which, however, conveys no meaning at all, and *abrill* must stand, so that the name signifies: *Cape of the end of April.* This nomenclature would suggest the idea that the cape was made at the end of the month of April. We know of but a single instance in which the name of a month was given to a place discovered by the Portuguese, that of the Brazilian bay of *Janeiro* (January). Whenever a proper name was given by them or by the Spanish mariners, it was that of a person, and, in particular, that of a saint of the calendar. Nevertheless, admitting the precedent of *Janeiro,* we may suppose that this cape was reached on the 30th of April. *Beda's Martyrologia Romana*, Vol. V., page 334, shows that this day is that of SS. Marianus et Jacobus, a nomenclature which possibly may have been rejected on account of its length; and for a like reason others, such as *Cabo do ultimo de Abril*, or *Cabo do trinta de Abril.* On the assumption that King Joam's caravels left Madeira by the middle of the month of March, 1493, it is not at all improbable that they struck this cape on the last of April, after a navigation of six weeks.

9. *Cornejo.*—It is positively impossible to decide whether the name reads *Coruejo or Cornejo.* The very strange shape of the penultimate letter invites to com-

parison with others of the kind. We find it occurring again in *Jenoves* and *San Jorge*, and therefore must write it *Cornejo* and pronounce like French *Cornejo*. Italians and Spaniards also would incline to write this name *Cornello* and sound it like *Cornellio*. Just as the word stands, it does not admit of any translation. Undoubtedly it is a native name and presents one of those perplexing cases of misspelling on the part of the copyist, who himself may have been at a loss how to read this name from the original map or from his intermediate copy. Ruysch, Ptol. 1508, reads *Corveo*, the Ptolemy of 1513, *Contello*, and Schoener, 1520, *Coniello*. The discussion of this name will be taken up again in the next chapter.

10. *Rio de dō diego.*—Written out in full—*Rio de don* or *dom Diego, Diego river.*

11. *C∴ delgado.*—To be translated: *Narrow Cape.*

12. *Pūta roixa.*—Transl.: *Red Point.*

13. *Rio de las almadias* signifies: *Canoe river.* The word *almadia* is of Moorish origin, meaning a boat hewn out of one single trunk, in contra-distinction to the timber-made boats of the Portuguese and Spaniards.

14.—*Cabo Santo* is the *Holy Cape.*

15. *Rio de los lagartos* or the *Alligator river.*

16. *Las cabras.*—As the words stand, they ought to be translated: *the Goats.* Such a name, just at this place, seems to be inadmissible. The letter *c* is rather to be viewed as a common national aspirate, and the reading should be therefore *abras* instead of *cabras.* This reading was proposed by Mr. Harrisse, and affords full satisfaction. For just at this place (as will be shown

further on) the coast presents a succession of inlets or channels opened by the impetus of the surf, and for these the Spaniards used to employ the word *bocas* or *mouths.*

17. *Lago luncor* or the *Luncor* (?) *lagune.* This does not admit of any plausible interpretation.

18. *Costa alta* or the *High-coast.*

19, *Cabo de boa ventura* or *cape of Good Luck, Lucky Cape.*

20. *Canpice*—The *p*, as it stands on the chart, at first sight looks like an *f;* and the reading would then be *canfuce.* Upon closer examination, however, the apparent *f* will be found to represent a *p*, as this letter is elsewhere written on the chart. If it were meant for an *f*, it ought to show the long flag-dash, which it has not. No interpretation can be found for this word *canpice.* Probably it is of native origin. Ruysch, as will be seen, leaves it out entirely. The Ptolemy of 1513 writes very indistinctly: *Caninar*, and Schoener 1520, *caninor.* The explanation suggests itself that the copyist himself was embarrassed in reading his original text. The word did not fall within the compass of his linguistic experience.

21. *Cabo d. licōtu.*—The abbreviation does not admit of other and better completion, than that of *Cabo del incontro*, which means the Cape of Encounter, or combat. Ruysch has *C. Elicontii.* The Ptolemy of 1513 *C. delicontre* and Schoener, 1520, *Cabo dellicontis.*

22. *Costa del mar Vacano.*—Correctly recognized, but rendered in bad orthography, this inscription will be found in the Ptolemy of 1513 with *C. del mar usiano*, or the *Cape of the Ocean Sea.*

At this place the picture of the coast comes to an end, and by this last inscription our hydrographers evidently did not intend to express anything more than that their exploration and survey were stopped here on account of the coast and the ocean extending before their eyes to an immeasurable distance.

From this attempt at a correct reading of the names, we now pass on to examine whether these names may be made to disclose the identity of the places upon which they were bestowed by the Portuguese cartographer.

(*To be continued.*)

THE GREAT BASIN.

BY

WM. H. BREWER.

"The Great Basin" is the name popularly applied to a region of the Western United States lying between the Sierra Nevada and the Wahsatch Mountains. It has no one single character which does not belong to some other portion of the globe, yet it constitutes the most distinctive geographical feature of the North American continent. It is an area of interior drainage, that is, none of its streams flow to the sea. Such areas are found in the other continents, but this one has a combination of features which belongs to it alone. Even if this was not the case, from its position within our own country and because of its actual character, it has for us an especial geographical interest.

There is a large and rapidly growing literature relating to this region, but the most of it relates either to special features or else is a narrative of travel. I know of no recent and general description of the basin as a whole, therefore in this lecture I purpose to bring together items of common information and to consider it as a geographical feature of our country, rather than to give you the results of recent original exploration. My own work in the basin was done long before any part of its present railroads was built and was confined to the Western edge.

Moreover, the more important observations I then made have been published elsewhere in connection with the various scientific objects for which those explorations were made. I have only seen the other portions of it as the passing traveller sees it since railroads have penetrated that country.

But let me here say, the traveller of to-day who goes whirling across it by express train in luxuriously equipped palace cars, well supplied with all the comforts and luxuries of travel, and has abundant to eat and to drink, when trains reach their destination on time and distant friends can be communicated with by telegraph, and when the whole breadth can be compassed in a day or two; such a traveller, I say, can know little of the toils, the discomforts, the hardships and the positive sufferings with which earlier travellers crossed it; nor can he appreciate or even imagine the sufferings incident to the earlier explorations. The tragedies of those days seem to us as the creations of romance, and the tales of adventures and experiences seem as improbable as the story of the Arabian Nights.

Each of the continents has regions of interior drainage. Those in Asia and Africa are larger than ours, and there are various smaller ones, but the chief among them (unless it be the Sahara) so lie in the interior of the land that the waters flow from their borders outward to two or more oceans. Ours lies entirely in one continental slope; that is, it is entirely surrounded by land which is drained to the Pacific.

These areas of interior drainage on the various continents vary greatly in their details of character, and have, in fact, but the one feature in common, that none

of their waters flow to the sea. The term "Basin," which appears to have been first applied by Captain Bonneville to ours, has come to be used as a general term for them all, and is the descriptive term used in some text books in Physical Geography.

This use of the word is on the whole unfortunate in that it suggests a great error as to the actual character of such regions, and also suggests an erroneous cause for their existence. I find many people, otherwise intelligent, who have the idea, more or less vague, that the causes lie in the structure of the country, that there is a veritable basin or sunken area with a rim of mountains about it so high that the waters cannot get over the edge and flow outward to the great sea; that it is the rim which causes the basin and turns the waters inland to sink in the sand or evaporate from salt lakes in the enclosed and sunken interior.

This misconception has been intensified by the fact that most travellers who cross it, find on one side the Rocky and the Wahsatch Mountains, and on the other, the still grander and higher Sierra Nevada. To such travellers the region seems obviously a basin with high mountains on either side which seem barrier enough to hold back the water, and a sufficient cause to prevent the rivers from ever reaching either the Atlantic or Pacific.

The real fact is, that it is not a basin of which the rim is an essential feature. The cause is climatic and not structural. It is in the air above it, and not in the rocks beneath it; it is the climate and not the geology or topography that makes the "Great Basin."

Pardon this elementary talk, but it must be kept in

mind for an appreciation of the actual features of this remarkable region. It is a dry region, and it is the dry climate that makes the basin and not the basin that makes the dryness.

Whether a region of country is drained to the sea or not depends entirely upon the relative rain fall and evaporation, not at all upon its geographical structure nor how high a rim of mountains there may be around it, nor how deep its valleys may be. If more rain (or snow) falls on an area than evaporates from its surface, then the surplus water runs off in streams. If these streams run into a hollow with a rim, a lake will form in the lowest place, and the lake will increase in size until the evaporation from its surface will just balance the streams that run into it. Such is the case with the Great Salt Lake and the Caspian Sea. If more rain falls than can evaporate, then, give it time enough, the hollow will fill up and overflow, no matter how great the area, how high the rim, or how deep the depression. Most of the lakes of the earth are of this kind, from the mere pond to Lake Superior and the great lakes of tropical Africa. All such lakes have streams flowing into them fed by the rains and an outlet of fresh water running out. This must be so, whether the bed of the lake is below the sea level as is that of Lago Maggiore, and many of our own lakes, or whether as high as Lake Titicaca or the lakes on the borders of China.

Such fresh water lakes may lie within areas of interior drainage, their outlets running into the still lower lakes which are salt. Some such lakes are high above the sea, as are Tahoe in our own basin, and Titicaca in South America; others are low as is Lake Genessareth in Pal-

WASHINGTON
MONTANA
Portland
Salem
OREGON
IDAHO
NEVADA
UTAH
THE
GREAT BASIN
Carson
Sacramento
S. Francisco
Oakland
PACIFIC
OCEAN
ARIZONA
Los Angeles
S. Diego
MEXICO
GULF
OF
CALIFORNIA
THE GREAT BASIN
OF THE UNITED STATES
between the Wahsatch Mountains and the Sierra Nevada

estine, which is 850 feet below the level of the ocean, its overflow being into the still deeper depression of the Dead Sea.

The size of the salt lake in such a depression depends entirely upon the relations between the size of the streams which feed it and the evaporation from its surface. Should the streams increase for a series of years, the lake will rise and the surface increase. If the rains diminish then the lake also diminishes in area. The size of the lake does not depend on the size of the basin, nor on its height above the sea, nor on the height of its rim. The rim about the basin containing such lakes may be four miles high, as with some of the lakes on the Pamir or it may be merely low sand hills but a few feet high, as is a portion of the rim of the Colorado Desert.

The lakes from which the last evaporation takes place in all these regions of interior drainage are salt, but they vary greatly in their saltness; the one possible exception is Lake Tchad in the Soudan.

The salt in these lakes is usually not the pure salt used in our households, but a mixture of various compounds known to chemists under the general name of salts.

There are now in this American basin depressions in every stage of lake and dryness; fresh water lakes like Tahoe, of deep, cold, very clear, fresh water; others like Pyramid Lake, brackish, but not salt enough to kill fresh water fish; others salt to saturation. Some are *playas* with water only after the rains of winter, drying up in summer to plains of glistening mud. In other valleys are expanses of shallow salt or alkaline water lasting throughout some years, but which sometimes dry up leaving only sheets of salt and alkali in the depres-

sions. Still other valleys have great beds of salt, showing where lakes have entirely dried away, the beds of salt being their fossilized remains.

After this long introduction in elementary physical geography let us notice more particularly the features of the American Great Basin.

It lies between the Wahsatch Mountains on the east and the Sierra Nevada on the west, and extends about 12° of latitude, or from about latitude 44° in Oregon to about latitude 32° in Lower California.

I have plotted on the United States land office map the outlines and area of the Basin for our use here; by carefully following the line of divide around the whole area and then shading the region the better to show it. Its extreme length according to this map is about 900 miles, and the extreme breadth at right angles to the line of greatest length is about 520 miles.

Estimated from this map its total area is about 217,850 square miles. Mr. Russell, of the United States Geological Survey, in his monograph on Lake Lahontan, estimates the area at 208,500 square miles.

The States and Territories of this part of our country are of such great size that we, inhabitants of the smaller States, find it hard to appreciate this enormous area; but to do this we have only to mark a corresponding area (in shape and size) over the Eastern United States. If its northern portion be placed in Canada near Lake Huron and its eastern portion at the Hudson River and the Connecticut line, its southern point will be in Georgia and its western line extend through Tennessee, Kentucky, Indiana and Michigan. The whole area is nearly five times as large as the State of Ohio.

This great region is traversed by numerous mountain chains having a general north and south direction with valleys or plains between them. These mountain chains vary greatly in their geological structure, in their topography and in the aspects of their scenery. Some are so isolated that we can travel entirely around them, and others have some topographical connection with some other chain. They are of all heights, from the mere hill to peaks above 12,000 feet, and of various extent from the isolated butte to chains of several hundred miles in length.

The valleys between them have even greater variety of character. Some are fertile, others unmitigated deserts. Some are really high plateaus, as is that of the Great Salt Lake; others are below the level of the sea, for in this Basin are found the lowest portions of the surface of the American continent.

The whole area is not one basin in the sense of one drainage area, one water-shed as engineers would say, but consists of many. All parts of the region are dry, most of the rain falls on the mountains and runs off into salt lakes or into the *playas* or "sinks." I know not how many drainage basins are combined to make this whole area, but there is certainly a score or more.

Bear in mind that if there was rain enough, all these lower places would fill with water until it ran over their respective rims. The drainage from the mountains would run down their slopes as now. A great number of lakes would be formed in the various valleys and their outlets would find their way to the Pacific by various routes. Some would empty northward to the Snake and Columbia Rivers, thence to the ocean; some

find their way westward through the Sierra Nevada by way of the Klamath Valley; some southward into the Colorado River or the Gulf of California; and possibly still others across Southern California to the ocean.

But, over the whole region the actual rain-fall is vastly less than can be evaporated from the surface and this scantiness of rain-fall is the all-controlling factor as to its agricultural resources and its fitness for the homes of men.

The economic foundation of civilization is agriculture, and for agriculture there must be rain in considerable quantities, at least in occasional years. Crops may be grown for a time by irrigation in a rainless region, but they cannot be so grown for an indefinite period. The same causes which make lakes salt or alkaline if there be no outlet ultimately make soils also salt or alkaline, and this causes barrenness.

Streams always contain a small proportion of certain salts which have been washed out from the soils from which the waters come. Where these run into closed lakes, and the water is evaporated from the surface, the salt is left behind, thus making the lake salt. The character of the salt depends upon the chemical character of the soil of the water-shed. In the same way where the water of rivers or streams is used for irrigation, if all the water is evaporated from the cultivated soil, injurious salts are left behind which accumulate and finally destroy the fertility of the land and turn it back again into a desert. For irrigation to be permanently successful, there must be some rain, and in occasional years a sufficient water to wash out and carry the deleterious salts away.

Every where in the Eastern United States, more rain falls upon the land than can evaporate from it. In New England, New York and the region east of the Mississippi, one year with another, from 40 to 70 per cent. of the rainfall flows away to the sea, and the soils of such localities may be perpetually fertile.

West of the Mississippi a smaller proportion flows to the sea; but over all the region east of the 100th meridian some of the rainfall of every year flows from the land; there are but few places in the United States outside of the Great Basin, where some of the rainfall of occasional years does not flow away. Over large portions of the Great Basin, the rainfall is so slight that there is neither water for irrigation nor the conditions for permanent fertility, even if waters could be found. There are, however, many isolated districts that are fertile and may be irrigated.

The mineral wealth of the region, however, is vast; it is indeed wonderful both in variety and in richness; but mineral wealth alone and of the kinds most common in the Great Basin has never yet made a permanently prosperous State.

The truly prosperous State must be a country of homes, and this occurs only where agriculture can be praticed on a considerable proportion of the land. On a relatively large proportion of the American basin agriculture is not possible. It can never support at best more than a relatively small agricultural population, although there are scattered spots of great fertility and some of marvellous beauty.

This region was not always so dry. In the geological age just preceding the present one, there was a period

during which our Northern hemisphere was much colder and the climate much wetter than now. It was called the Glacial period, and ice covered much of the Northern hemisphere. Geologists tell us that it covered all New England and New York, the Southern edge of the great glacier reaching down into Pennsylvania and Southern Ohio in the Eastern United States. Then there were also stupendous glaciers in the Western mountains. They have left their traces everywhere. Glaciers sometimes a mile thick and several miles wide filled the valleys of the Sierra Nevada, and extended down into the Basin, their great moraines at the mouths of the numerous cañons still testifying of their great extent and volume. Incident to this period, both before and after it, there was abundant water in the Great Basin.

Lakes then existed there, some of great size, and from the nature of the country they must have been of marvellous beauty. Geologists have especially interested themselves in the study of the history of two of these lakes, one in the western part known as Lake Lahontan, another farther east called Lake Bonneville. The great Salt Lake is what is left of the latter; the former is dried away to a few shallow salt lakes or to dry deserts. This western Lake Lahontan has been made the subject of a special monograph by Mr. Russell, of the United States Geological Survey. According to this authority its area was at least 8,400 square miles, (or a little larger than the area of the State of Massachusetts). We find if we look at a copy of its map that the lake was more irregular in shape than any large lake at present known upon the globe, its outlines deeply indented by numerous mountain chains extending far into it, and irregular

islands, one of large size, dotted its surface. Although a fresh water lake, it is thought to have had no outlet; that it began to dry away and disappear before the depression was entirely filled to overflowing. With a change in climate it has dried away; about a half a dozen lakes more or less salt occupying some of the lower depressions, other parts of its bed being occupied by "*playas*" or alkaline "sinks," which are unmitigated deserts.

The chief of these lakes are Walker's Lake, South and North Carson Lakes, Pyramid Lake, Winnemucca Lake, Honey Lake, and Eagle Lake; and the two most notable deserts are the Black Rock desert in the North and the Carson desert in the South.

There are several fresh water lakes within the watershed of this ancient lake, the most important and noteworthy of which is Lake Tahoe. This lake, so justly celebrated for its beauty, lies at the eastern base of the Sierra Nevada at an elevation of about 6,000 feet. It is more than 1,500 feet deep, its cold waters are of great clearness, and the Sierra rising boldly from its western shore to peaks of 10,000 feet makes it one of the most picturesque lakes of the continent. Its outlet, the Truckee River, runs chiefly into Pyramid Lake and Winnemucca Lake.

With the change of climate, Lake Lahontan slowly disappeared by drying up; its successive shores constitute a conspicuous feature of the landscape, and, as already stated, all that is left are the few salt and brackish lakes and beds of salt and alkali scattered here and there in the lower depressions.

During the existence of this lake the region was subject to volcanic eruptions and probably to changes in

level incident to such disturbances. Volcanic activity then existed in many parts of the region within and beyond its actual borders, and numerous mineral springs yielded the various products found in volcanic countries. The chemistry of the drying up of this lake is therefore as interesting as is its geology. There is a curious variety of salts found; here a swamp, in which are buried inexhaustible quantities of crystals of borax; there, plains covered with alkaline efflorescence like snow; again, there are lakes of carbonate of soda; Mono Lake, just beyond the old lake, is a nearly saturated solution of salt, soda, borax and other chemicals. When camped on its shores we found its waters as efficacious in washing our woollens as the best soap-suds, and the barbers of Esmeralda used it for shampooing.

Many springs made deposits of tufa; and some of the tufa masses are of extraordinary, not to say, grotesque shapes, of which illustrations may be found in photographs.

Mono Lake is thought by Mr. Russell to lie outside of this old lake basin, but at the time of my earlier visit I believed it to have been included.

During the existence of Lake Lahontan, extensive beds of sediment were laid down upon its bottom, which beds have been again furrowed by the erosion of the modern rivers which now flow over what was then the lake bottom, and have cut into the strata of the old lake bed.

This sediment is in part such as is generally washed from mountains and in part the volcanic ashes and dust which was rained upon this region from the neighboring craters and sank as an impalpable powder in its

waters. Mr. Russell gives a wood-cut in which volcanic dust from various other sources and from these ancient sediments is brought together and compared. The resemblance between this old Lahontan dust and that from Norway in 1875 and Krakatoa in 1883 is very obvious.

Of the various volcanoes of this region or its borders, the cones and extinct craters of Lake Mono are perhaps the most remarkable. The views of them in published works are from the photographs of Mr. King; I climbed them in 1863; their steep sides are largely of loose sand and pumice, and in the material there is much variety both as to color and texture; obsidian or volcanic glass is also very abundant and of many colors. What interested me more than any other feature of these cones was the finding of a few fragments of granite, roasted and altered by volcanic heat within these craters; they had not been left there by the glaciers. and I am not aware of similar productions having been found elsewhere. They must have been cast up in the later stages of the eruption, but precisely how they could have been thus torn loose from their original position and left as we found them is indeed difficult to understand.

The scenery of this immediate region is sufficiently striking. The steep volcanic cones with a few scattered and stunted cedars and nut-pines, the unmitigated desert at their base with the ever present sage brush and grease wood; Mono Lake itself, 6,000 feet above the sea, its heavy waters strangely placid and smooth; the great Sierra beyond, like a wall against the sky; the Mt. Dana group rising precipitously from the lake to above 13,000 feet and streaked with snows above; the great

moraines stretching out from the mouths of the cañons upon the desert at the base, constitute altogether a picture so unlike anything we have elsewhere in the United States, so unlike anything and everything we have east of the Mississippi River, that it leaves an impression on the mind of even greater desolation and barrenness than actually is the case.

The average rain-fall of the basin as a whole has been variously estimated, but no one places it higher than twelve or fifteen inches annually. In the plains and valleys the average is vastly less; sometimes several years passing without practically any rain-fall in some of the valleys and it is probable that in some places the average is less than an inch per year. But so far as I know there is no portion absolutely rainless. The rains, however, are very uncertain, and some regions are subject to occasional severe local showers known as "cloud-bursts." These are simply extremely local, heavy showers in which several inches of rain may fall in a limited region, and within a few minutes. The waters gather in the ravines down which they rush many feet deep, with resistless force bearing on their surface the various light objects picked up in their impetuous course, and sometimes excavating gullies many feet in depth within a short time. The stream ceases almost as suddenly as it came. Many such have been recorded, some of which have been very fatal to persons travelling in the region in which they occur.

The dryness of the air, the cloudless sky, the capricious winds, the local whirlwinds which carry up dust, all conspire to give a peculiar beauty and wonderful variety to the atmospheric aspects of the scenery.

Sometimes, particularly in winter, the atmosphere is of marvellous clearness and transparency, objects a hundred or more miles away being clearly and sharply discernible from the peaks within the basin or about its borders. But through the most of the summer season a haze, composed of fine dust, fills the air so that it is much less transparent.

Many of you may remember the remarkable sunsets and "sky-glows" of the autumn of 1883, which were believed to have been produced by fine volcanic dust in the upper regions of the atmosphere brought from the distant eruptions of Krakatoa.

What was then believed to have taken place on a world-wide scale, so far as its effect on the colors of the sky and in producing various optical phenomena relating to the atmosphere was concerned, certainly does take place on a smaller scale, but in a greater variety in the atmosphere over the Great Basin. There is a charming variety of colors induced by the fine dust particles in the air, either by polarization, by diffraction, or other decompositions of the light. There are sunset glows of various colors and there are mid-day glows. We have skies of blue and we have green skies, and purple and pink and various shades of yellow, and so on through many colors and effects, which were it possible to portray on canvas, we would pronounce to be wholly unnatural, however beautiful.

When in the mountains along the western rim and looking out over the deserts and beyond the successive mountain chains to the east of us, this play of colors and varying aspects of the sky was of never failing interest.

And now a few words as to the native vegetation of this region. Popularly, deserts are supposed to be without vegetation. Practically, if there is absolutely no rain nor water, there can be, of course, no vegetation; but if a region have some rain, even though it may be at long intervals, there will be plants of some kind.

The species of the Great Basin are largely shrubby and adapted to the dryness and heat they are liable to be subjected to. The species of our climate are of kinds that cannot stand protracted drought; they die when dried, but desert plants retain with great tenacity a sufficient amount of moisture to preserve their life, although they may suspend their vegetative functions for a very long period. Let me illustrate. You are all familiar with the lichens of our climate, growing on the rocks, fence-rails, etc., which in rainy weather are flexible, filled with water, and grow; in a drought they dry so completely that they are brittle and may be pulverized to a powder in the hand, but yet they are not dead; no more dead than a seed; they only require water to again sprout and grow, and when rains come they imbibe moisture again, become flexible, their sap circulates and they grow and increase in size until the next drought comes to again dry them out and suspend their growth. They rest during the drought as other plants do during the cold winter. Their functions are merely dormant, they are not dead. So these desert plants cease their growth during the long and excessive droughts to which they are subjected. These species (for there are many kinds), have usually small leaves, the wood is usually hard and brittle; they grow when there chances to be sufficient moisture and when the

severe droughts come on them suspend their growth as our trees do in winter, and await better times.

I was in one valley between two high mountain ranges; the valley itself 4,000 feet above the level of the sea, where there had been less than three-quarters of an inch of rain during the previous eighteen months, and where we found the heat in July from 100 to 110 in the coolest places we could find, and yet this desert was not bare; clumps of shrubs grew every few rods, sage brush on the slopes, grease wood where the soil was alkaline, and various other species. Some of these were so dry that they would readily burn when a match was applied; we could not call them "green" but surely they were not dead. The creosote bush grows in the more southern deserts, vile-smelling, with sticky, stinking leaves, so repulsive that it is said even the camels will not touch it. In justice to the camel I should say that this fact has been denied. One of the men who had charge of the camels introduced by Jefferson Davis, and tested on these deserts, told me that the camels did eat sparingly of even the creosote brush.

How long some of these shrubs can survive without rain, I have no idea, but one herbaceous plant, the *Lewisea Rediviva*, found on some of the drier peaks northward, after having been dried as completely as I could do it for herbarium specimens, continued to sprout and grow in the papers in my herbarium in New Haven, for several years afterwards. A botanical journal, some years ago, made a report of plants that had blossomed after the exceptional rains which fell on a portion of the desert of Atacama in South America, after fifteen rainless years. I know of no such tests regarding our own

desert plants, but I have no doubt whatever in my own mind but that there are a number of species to be found within our own Basin, that would live through several rainless years.

There are regions, however, that are practically without vegetation; and several of these are pictured in the Government reports of explorations. Some are alkaline "sinks," others drifting sand, still others areas kept barren by hot springs.

Among these are sand-hills taken from a photograph near the 40th parallel where they stretch for many miles; but drifting sands occur in many other places, sometimes polishing and carving rocks over which they blow, This is especially true on the Mojave and Colorado Deserts where this phenomenon, first noticed by Prof. Blake, has since been noted by many observers.

But in considering this barrenness and desolation, we must remember that there are many spots of great beauty and fertility. These are always near streams at the base of mountains. Even in the barren Owens Valley there are fertile spots, and the unmitigated desert is easily changed into a garden by irrigation, where water of the proper quality and quantity can be obtained. Those who have seen the Carson Valley, with its prosperous farms and green fields and background of high Sierra, must recall it as a beautiful picture.

The mountain scenery is of even greater variety than that found in the valleys; as already stated, the Basin is traversed by numerous mountain chains; and these have every variety of geological structure and every character of rock. Some are volcanic and there is a great variety of volcanic products; here, soft stratified tufas,

there, great lava flows, and again cones of ashes and cinders. There are mountains of trap and basalt, sometimes as columnar as that of the Giant's Causway.

Owing to the peculiar climatic conditions, the erosions and denudations of these mountains are peculiar. The ridges are sharp, the cañons V shaped. As they are rarely clothed with forests and often practically bare of trees, the whole of their elaborate sculpture is plainly discernible. They rise naked from the barren deserts, every ridge of their skeleton evident. In winter these views are even more striking than in summer. I have in mind a view after a recent snow, too light to cover the plain, but heavy enough on the mountains to completely whiten them. The naked, barren chain seemed as white as if carved in the whitest marble, its every ridge coldly clean, scarcely specked with tree or bush, its every ravine distinct, its serrated crest white and sharply cut against the blue wintry sky, the whole rising from the brown, desolate, sage-plain, presenting an aspect as unlike that of forest covered mountains, as if it belonged to another planet.

There are also mountains of soft strata; mountains of hard, metamorphic rock, twisted and broken; we have them of great variety of aspect, but, as a whole, they lack the rounded outlines, the covering of forest and the green of eastern mountains. We can hardly call them *Alpine*, because Alp strictly means an upland pasture. The green pastures which are such a characteristic feature of the mountains of Central Europe that they give their name to the mountains themselves are here entirely absent. In fact, one sees little green; it is said that in the whole State of Nevada, embracing over 100,000

square miles, that "there is only one spot where for more than six square miles together, the landscape is naturally green."

In the southwestern portion of the Great Basin are two or three remarkable depressions. One known as Death Valley lies near the eastern borders of California, only about 70 miles southeasterly from Mt. Whitney, the highest land in the United States. This valley is the sink of the Amargosa River, and was formerly believed to be the lowest on the American continent. Its precise depth below the sea-level has not been very accurately determined, the later statements making it 225 feet, although other accounts make it much deeper.

It gets its dreadful name because of the emigrants who have perished there. It is near one of the old trails which led into Southern California; and emigrants have been decoyed into it hoping to find water, and there perished.

A portion of the Colorado Desert, often called the San Bernardino Desert, the sink of the San Felipe is also a great depression below the level of the sea, probably deeper even than Death Valley. The portion below the level of the sea is said to be about 130 miles long by 30 wide, and the lower parts 360 feet below sea level. These figures are given from popular statements rather than official surveys. It, too, was the bed of a lake as no very distant period, and the old shore lines are strikingly distinct againts the sides of the surrounding mountains. Some interesting views of this feature may be found in the old Pacific Railroad Reports. The present Southern Pacific Railroad traverses this depression for many miles.

Portions of the eastern rim of this part of the Basin are merely low sand-hills separating the depression from the Colorado River and the Gulf of California. There have been various projects for flooding this region at the expense of the United States Government, and creating an interior lake which might fertilize a portion of the desert and modify the climate of Arizona. I have no faith in the practicability of the scheme.

Before leaving the western portions of the Basin, let me add a few more words regarding the variety of salts found in solution in the lakes or crystallized in the depressions. The country being more or less volcanic, we have the natural source for a great variety of products. The famous Soda Lakes near Ragtown in Churchill Co., Nevada occupy ancient craters; they are solutions of carbonate of soda and for many years have been worked for this material, producing some hundreds of tons annually. It is estimated that this lake contains nearly a million of tons of the carbonate of soda and sulphate of soda. Carbonate of soda is also obtained from various other lakes of the basin and borax from several places. Salt is also obtained in numerous localities; in some by evaporating the waters, and in other places rock salt of great purity is quarried from extensive beds.

Various other chemicals are found of great interest to chemists and mineralogists but of less economic importance. In the remains of some of these old lakes, gigantic crystals of a peculiar mineral called Thinolite are found which belongs exclusively to this region.

Nor must the numerous hot springs of the region be forgotten: I can attempt no enumeration of their num-

ber. Among the more famous are the Steamboat Springs near Virginia City. Here steam and hot water escape from cracks several miles in extent, and the silica and other mineral matter dissolved in the hot water, when deposited and cooled at the surface, have formed great mounds several hundred feet high and several miles in extent.

As these mineralized waters flow over the surface, they incrust or "petrify" various objects found there; even such frail organisms as crickets and flies are incased in silica, which is gelatinous at first but which ultimately hardens. Some of the hot springs have a reputation for medicinal qualities, and doubtless there are many which would be a fortune to the owner if located in some convenient locality east of the Mississippi River.

I have spent so much time considering the western portion of the Great Basin and the ancient Lake Lahontan, that I have less space left to me than I could wish for the consideration of that other and larger ancient lake, Lake Bonneville. This lake washed the western base of the Wahsatch Mountains, and it was as irregular in shape as Lake Lahontan. Its shores were indented with numerous promontories, and many bold and picturesque islands rose from its surface. It had an area of about 19,750 square miles or was nearly twice as large as Lake Erie. Bear River, the Weber, Provo, and Sevier Rivers, and other large streams from the Wahsatch flowed into it from the east.

This lake had an outlet northward through the present Red Rock Pass at the north end of the Cache Valley in Idaho, and thence to the Pacific by way of the Snake and Columbia Rivers. It has dried away, and the Great

Salt Lake is all that is left of it. It did not disappear regularly, but by successive stages and the terraces left, which mark its ancient shores, are the most striking features that meet the eye of the traveller about Salt Lake, and far to the southward in Utah.

Some portions of this old lake bed now constitute tolerably fertile valleys, watered by fresh rivers, but other portions are totally barren. The great plain lying to the west and southwest of Salt Lake is probably the most unmitigated desert of equal size to be found within the limits of the United States.

The present area of the Great Salt Lake is between three and four thousand square miles, but its size is fluctuating. It has risen and covers several hundred square miles more of surface than it did at the time of its first survey by Lieutenant Stansbury in 1849.

When the Pacific Railroad was finished twenty years later, or in 1869, the lake was said to cover 400 square miles more than it did at the first survey. Some increase has taken place since, and it is known that the surface of Salt Lake is higher and the waters deeper than forty years ago. The early Mormon settlers could ford the lake to Antelope Island; it is utterly impossible to do so at the present time.

This increase of water is not due to settlement and cultivation, but is doubtless due to some secular change in the rainfall on the mountains. The cultivation is mostly in the valleys, while the rainfall is mostly in the mountains. There are very many views illustrating the terraced shores of this old lake, but the effect on the observer of the actual facts is vastly more impressive than any views can be.

The great changes in climate which have produced the wonderful results described as occurring in our American basin are probably simultaneous with similar changes going on over much of the Northern hemisphere. The ruins of towns south of this region, the old Pueblos show that the drying up has extended in our own continent far beyond the present boundaries of the Great Basin, and similar changes have apparently gone on simultaneously with this in the Old World. The Caspian Sea lies below the present level of the ocean, and in its vicinity the drying up has been going on even in historic times. We have historic evidences of great populations where now is desert, and farther east in the same area of interior drainage there are evidences of great dried up lakes.

Lake Bonneville had an outlet. Of this there is no question, and we may believe that the overflow was very considerable. As stated earlier in this paper, the United States Geological Survey thinks that Lake La hontan had no outlet, and explains how the lake in drying up may have been freshened after the deposit of some of its salts by evaporation. I must confess that I strongly suspect that more complete exploration and investigation will ultimately show that it, too, had an outlet. It would surely be a wonderful thing if the period of rains and of successive dryness should have been so evenly balanced that the depression should run so nearly full and yet never overflow. I do not pretend to say where this outlet was, nevertheless I believe it to have existed. Moreover, my own and less complete observations made about Lake Mono many years ago led me then to believe that Lake Mono had, at some period, a

much higher level than has since been attributed to it; and, if I was not mistaken in my observations then, the area of Lake Lahontan may have been considerably larger even than that now attributed to it.

In considering the resources of the Basin as a whole, I do not wish to be misunderstood. The aggregate resources must be very considerable, the most striking portion of which will remain in its mineral productions; its great mineral wealth has brought to it its chief economical reputation. Its mines have yielded such quantities of precious metals that the finances of the world have been changed, and its production of silver led to the demonetization of that metal. The great Comstock Lode has been the locality of the greatest mines of modern times, and has led to more romantic and famous changes of fortune than the mines of any other part of the world during the same time.

It is unnecessary to compare its many mines with those of Mexico and Peru, but it is safe to say that they have had more to do with the finances of the world during the last twenty-five years than any others on the globe.

Regarding the agricultural possibilities, I repeat, it must ever remain a region of relatively sparse population. The portion in Utah has more popular interest in this regard because of its settlement by the Mormons. The geographical features of the region have been eminently adapted to the growth of such a religious system. It has been a law of the development of independent communities that they needed isolation for their early development, and also natural protection in their isolation. Persecuted and despoiled in the older and more

densely populated eastern States, the Mormons fled to a place of safety. "To build up Zion in the wilderness," they journeyed across the plains, passed through the mountains and settled here, far beyond the borders of civilization. Taking possession of the places better suited for their use, living in village communities, by irrigation they reclaimed portions of the arid soil, and made the desert indeed blossom as the rose.

It was especially suited to their conditions, that is, it had the physical characters and political situation to recommend it to a peculiar and persecuted people. When they emigrated this region was believed to be beyond the jurisdiction of the United States, and practically beyond the interference of Mexico; political isolation seemed, therefore, secured, and the mountains and the deserts about it were a protection against marauding outlaws and outside people seeking conquest. The land could be reclaimed and made extremely fertile by peoples living in communities, as did the Mormons. It was not adapted to settlement by the gradual pushing of the frontier line, as was the case in the more fertile western States. I need not follow up this wonderful story (which for personal reasons has always had a fascinating interest to me) further than to say that we find in the physical condition of the country one of the reasons for the success of this most wonderful religious movement and most astonishing delusion of modern times.

When I contemplated writing a paper on this subject I intended to have had much more to say regarding the early history and explorations in the basin, and the development of our knowledge regarding it. Many itemsof information picked up more than a quarter of a century

ago from the actors in the scenes and from individuals now passed away, might make an interesting chapter of more or less disconnected fragments of this early history; but a recent examination of the literature relating to our western country has shown me that many of the items of history which I believed only existed in tradition, or in the memory of the older explorers, have found their way into print into one form or another and hence need not be repeated for record here.

This Basin, while still containing many nooks and corners to be mapped and explored, is nevertheless the best known by far of the areas of internal drainage in any of the continents. Of the two greater ones, the Sahara in Africa and the still larger one in Central Asia, we still have but very imperfect geographical knowledge. Ours was the first to know a railroad, the Union and Central Pacific roads being finished across it in 1869, and portions of it are now crossed entirely by several railways. Branches from these penetrate to the interior by various routes and there are now within it many hundreds of miles of railway; I have made no attempt to estimate how many, but persons can now travel with ease and luxury where scarcely a generation ago only the most hardy could survive the hardships of travel, and towns have grown up where then were deserts.

In conclusion I will repeat that the Great Basin must ever remain a region of relatively sparse population, because of its scanty rain-fall.

In any region far from the sea the capacity for supporting a population depends upon the rain-fall or the possibilities for irrigation, and in this area there are

many localities of great beauty and fertility that can be irrigated, but all are relatively small when compared with the total area. In these limited districts there will be ultimately many beautiful places that will be noted for their picturesqueness, for their salubrious climate and the richness and variety of their productions, but at best they can never constitute more than a very small portion of the whole region.

There is some pasturage in the regions not adapted to cultivation where herds and flocks, more or less nomadic, have been pastured and will continue to be grown as in other dry regions, but the capacity of the country in this direction is small as compared with the regions favored with more abundant rains.

The wealth of its mineral resources has been alluded to at various times in this paper. This is justly celebrated because of its great variety and enormous abundance. When I first visited the State twenty-four years ago, there were then recorded an almost innumerable number of mining claims and it was said that more than six thousand mining companies were then in existence. While but a very small proportion of this vast number have proved profitable, it is still true that many towns, villages, and even cities have been built up at various mining centres. But mineral wealth alone, especially if of the precious metals, never builds up a continuously prosperous State; that is only founded on agriculture where people wish to build permanent homes.

The romances of sudden and great wealth, acquired from the mines in these regions by persons earlier in humble circumstances, are familiar to the whole world. Some, who began as poor laborers and low in the

social scale, but who have died among the millionaires, are known the world over, yet such do not make a prosperous State. Nevada, the only State within the basin, has steadily declined in population in late years, until now the entire population on its more than 100,000 square miles would scarcely be sufficient for a fifth-rate eastern city. The very men who have made great fortunes in Nevada go elsewhere to enjoy their wealth notwithstanding its healthy climate, and I fear this will be the case for a long time to come. Nevertheless because of the abundance and the wide distribution of mineral wealth, the mineral resources of the basin must ever continue to be great in the aggregate.

Portions of this subject have grown to greater length than I intended, because of the richness of the matter, and I have scarcely alluded to several items that I had desired to speak of more in detail. One is the exceedingly rapid evaporation that takes place or may take place from its soils and its lakes. By actual experiment it has been found in some places to be a half an inch per day or fifteen inches per month, and it is no wonder that under such conditions large portions are desert.

In certain places Artesian wells are practicable, but inasmuch as their capacity depends upon the amount of water falling on the mountains or hills which constitutes the source of their supply, they can never be of extensive use or success except in very limited areas. They may however be the means of making the establishment of stopping places and stations practicable in regions now difficult to be traversed because of the long stretches between existing supplies of water.

In conclusion I will say it must ever be a region of peculiar interest to the geologist, the botanist and the mineralogist, and will be more and more visited by general tourists in search of new scenery and aspects of nature unlike those found in more rainy regions; that while as a whole it can never have more that a sparse population as related to its size, yet because of its vast area, and because of the great fertility of particular spots, it probably will have ultimately a very considerable population in the aggregate. It will have here and there localities which will become places of resort for those seeking health, for those suffering with ailments which are benefitted by a dry and warm climate. It will ever be an intensely interesting region because of its strong contrasts between inhospitable desert and productive fertility; and despite its general desolation it will be visited because of its inherent and especial beauty.

Yale University, December, 1888.

GEOGRAPHICAL NOTES.

INTERNATIONAL GEOGRAPHICAL INSTITUTE.—This Institute, which is to be opened in Paris towards the end of the month of July, will comprise a reading-room, a permanent exhibition of apparatus and instruments for the use of explorers, and a school of gratuitous instruction for travellers.

M.-D. Kaltbrunner, a distinguished geographer, to whom is due the idea of the enterprise, will give in the chief cities of France a course of lectures on the "Art of Travelling;" the proceeds of the course to constitute the nucleus of a "Fund in Aid of Explorers," of whatever nation. It is hoped that other lecturers will lend their assistance to the work.

Communications may be addressed: M.-D. Kaltbrunner, géographe, Champigny-sur-Marne, près Paris.

SUMMER HEAT.—It may help the philosophy of those who are compelled to endure the ordinary American summer to know that the Government Geologist of South Australia, who has lately returned from an exploration in Alexandra Land, reports a heat of 124° in the shade. Neither Aden, nor Massowah, nor Fort Yuma can do better, or worse, than this.

THE GEOLOGICAL MAP OF NEW JERSEY.—This map,

which is sheet No. 20 (and the last) of the Atlas of New Jersey, brought out by the Geological survey of the State, under direction of Prof. Geo. H. Cook, is drawn on a scale of 5 miles to an inch. The formations lie with unusual regularity northeast and southwest across the State.

The southernmost and largest is of yellow gravel and sandy clays; next come fire clay and sand and clay marls; then trap, red sandstone and shales; then gneiss, granite and limestone; then Hudson River slates, and at the northern end sandstone.

THE FLOODS IN PENNSYLVANIA.—Towards the end of the month of May long-continued rains in Central and Western Pennsylvania did great damage; but all other loss seems as nothing in comparison with the destruction that fell, in the afternoon of May 31, upon the Conemaugh Valley, in Cambria County.

The Valley is a narrow gorge cut by the Conemaugh River through mountains rich in coal and iron and limestone, which supplied the industries of many towns and villages. At the upper end, and at an elevation of about 300 feet above the river, was a body of water formerly known as Conemaugh Lake. This lake, originally a ravine, had been formed by a dam, between 800 and 1000 feet long, built across the lower end.

The height and thickness of the dam are not accurately given, but an engineer familiar with it affirms that it was equal to any ordinary pressure. At a level of 7 feet below the top of the dam, the water of the lake covered a surface three miles in length by more than a mile in width.

The inflow from the rains raised this level on the 31st of May at the rate of ten inches an hour, and at 1 o'clock P. M., when the engineer walked over it, the top of the dam was three inches below the water, which was beginning to cut a channel for itself.

Of what material was the work that yielded so soon? Less than two hours after, the dam gave way and the flood poured down the valley. The three miles of water were drained out, says the engineer, "in forty-five minutes."

Warning of the danger had been sent by telegraph early in the day, but there were many whom it did not reach.

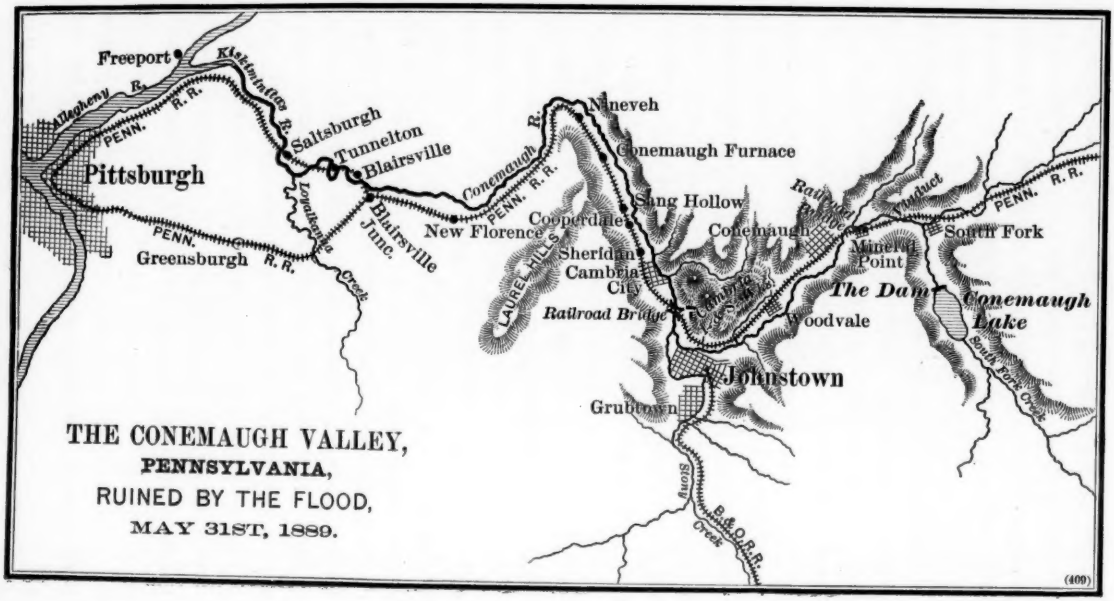
Everything in the path of the torrent went to ruin. The smaller towns and villages have been annihilated; and the loss of property amounts to many millions. At Johnstown alone, 13 miles from the lake, the damage done is summed up at not less than $20,000,000.

The number of those who perished may never be rightly known; but men begin to believe that the estimate of 8,000 may fall short of the truth.

No calamity of equal magnitude is recorded in the history of the United States.

THE SACO RIVER.—The *Scottish Geographical Magazine* for June publishes the dates, supplied by Mr. John M. Batchelder, Cambridge, Mass., of the opening and closing of the Saco River, *in that State*, as observed by him for a series of years beginning in 1820. The Saco, it is added, is situated in lat. 43 31′ N., long. 70° 26′ W.

Not even the best will in the world can bring this position within the limits of the State of Massachusetts,


Freeport
Kiskiminetas R.
Allegheny R.
PENN. R. R.
Saltsburgh
Tunnelton
Blairsville
Pittsburgh
Conemaugh R.
PENN. R. R.
Loyalhanna Creek
Blairsville Junc.
PENN. R. R.
Greensburgh
New Florence
Nineveh
Conemaugh Furnace
Sang Hollow
Railroad Bridge
Viaduct
PENN. R. R.
Cooperdale
Conemaugh
South Fork
Sheridan
Cambria City
LAUREL HILLS
Mineral Point
The Dam
Conemaugh Lake
Railroad Bridge
Woodvale
Johnstown
Grubtown
South Fork Creek
Stony Creek
B. & O. R. R.
THE CONEMAUGH VALLEY,
PENNSYLVANIA,
RUINED BY THE FLOOD,
MAY 31ST, 1889.
(409)

and the table of dates is, therefore, less useful than it might be.

Climatology of Brazil.—Mr. H. Morize begins, in the January number of the *Revista do Observatorio*, of Rio de Janeiro, a sketch of the climatic conditions of Brazil. The metrical system is employed throughout. There are three great zones in the Empire. The first, which is called the torrid, or tropical, comprehends the part of the country in which the mean temperature exceeds 25° (77° Fahr.) The line that marks off this zone passes to the S. of Pernambuco, through Alagôas, or Sergipe, cuts off a section of Goyaz and comes out in Matto-Grosso below Cuyabá.

The provinces of Pernambuco, Parahyba, Rio Grande do Norte, Ceará, Piauhy, Maranham and Amazonas, are entirely within the tropical zone.

The second zone, the hot or sub-tropical, lies between the isotherms of 25° and 20° (77° and 68° Fahr.). The line of 20° passes through the southern part of the province of S. Paulo, leaving to the S. a fraction of S. Paulo, the larger part of Paraná, and the entire provinces of Santa Catharina and Rio Grande do Sul.

The third or temperate zone lies S. of the second, and includes the provinces of Paraná, Santa Catharina and Rio Grande do Sul, with a portion of S. Paulo. The mean temperature varies between 15° and 20° (59° and 68° Fahr.).

The tropical zone may be subdivided into three parts: 1st, that of the Upper Amazonas, 2d, that of the interior of Maranham, Pará, Matto-Grosso, Piauhy, (and as far as Bahia and Minas-Geraes), and 3d, the coast re-

gion of Pará, Piauhy, Ceará, Rio Grande do Norte, Maranham and Parahyba. In the Upper Amazonas there is a greater rainy season, which begins at the end of February, and lasts till June, and a season of lighter rains, which begin in the middle of October, and cease early in January. Both make the rivers overflow, and there is a difference of nearly 46 feet in level between the lowest stage of the water, in September, and the highest, which occurs in April or May. There are two dry seasons, a long one from the first of July to the middle of October, and a short one from January to February. At the close of the heavy rainy season, there is for a few days a lowering of the temperature to such a point that it is said many of the fishes in the River Teffe die at this time,

According to Mr. J. Pinkas, chief engineer of the projected Madeira-Mamoré Railway, the mean temperature on the Upper Madeira is 26° (79° Fahr.) and the highest 39° 5′ (102° Fahr.). The heat is oppressive, because of the humidity, the hygrometer varying constantly between 80 and 100. The condensation which takes place immediately after sunset is so great that men sleeping under thick tents find their clothes wet in the morning, and the tent cover soaked as if a heavy rain had fallen.

In this part of the Amazonas the prevailing wind is from the S. W., with frequent calms, and a lowering of the temperature. These calms occur in March, April and May, and the cold is produced by the descent of the icy air from the summits of the Andes. The arrival of this cold current takes place always a few hours after the sun has passed the meridian, and is invariably preceded by a very high temperature, with an atmosphere

saturated with moisture and a barometrical depression of from 5 to 6 millimetres.

These rapid changes occur in the whole intertropical zone of the Continent. They are also met with in the interior of all the Northern provinces, where a fall of 20° in a few hours is frequent.

In Matto-Grosso the prevailing winds are from the N.W. and the S.E., the former warm and moist, the latter always very cold. During the summer the pampa wind from the S.W. brings occasional storms with a fall of the thermometer.

At Cuyabá (the capital of Matto-Grosso) the mean temperature of the year 1876, was 27° 7, (82° Fahr.), and that of 1877, 26° 7 (80° Fahr.). The temperature is at daybreak from 4° to 6° (7° to 11° Fahr.), below that of midday, and it continues to rise until 4 or 5 o'clock in the afternoon, when it begins to diminish. Observations made for the months July–October, 1888, with excellent instruments left by the brothers Von Steinen, confirmed the previous record.

On the table-lands of the province it is not uncommon to see frosts in July (a winter month). In the coast-lands, the third subdivision of the tropical zone, the temperature is more equable. Here the rains occur in summer and autumn and are heaviest in April.

At S. Luiz de Maranhão (2° 31′ S. Lat.) the annual rainfall is 2m .45 (96 inches), and the rainiest months are March and April. The range of the thermometer is very slight, and the wind blows all the year from E.N.E.

At Therezina, capital of Piauhy, the temperature varies from about 78° to 83° Fahr.

During the dry season the wind blows from the S.S.E and E, and in the rainy season from the N. Thunderstorms are frequent in the months of May and September. At Amarante, in the same province, much the same conditions prevail, and the summer season sometimes passes without a single drop of rain.

The climate of Ceará, the province to the E of Piauhy, is also marked by regularity. It is only in the mountain region that the cold makes itself felt, and there the mean is in some places 25°, in others 43° Fahr. The distinction between the dry and the rainy seasons is more sharply defined, the former beginning in July and lasting till February and the latter covering the rest of the year. The mean annual rain-fall, deduced from 28 years' observations, was 1m .50 (59 inches). During the long, dry season, the plains, which feed the immense herds of cattle, are wholly burnt up by the sun, and the poor beasts retire to the woods, where they keep themselves alive on leaves and shrubs till the return of the rains, when in a few weeks the land that had been dried to powder is covered with the most vigorous growth of grasses. There are, however, seasons when the rain fails, and the cattle die by thousands, and the population suffers the extremity of famine.

According to one authority quoted, these droughts are periodical, the greatest occurring every 100 years and the less severe every 20 years, without counting seasons of partial drought. In 1792 not a drop of rain fell during the whole year, and the Captain-General of Pernambuco reported to the Portuguese Government that more than a third of the population had died of starvation.

The province of Pernambuco enjoys a climate somewhat fresher than that of the tropical zone and approximating to that of the warmer countries of Europe and the Mediterranean coast of Africa. In this province, as well as in Alagôas, Sergipe and the sea-coast of Bahia, rain falls throughout the year, though the greatest precipitation is in June, July and August, Observations at Recife (Pernambuco), the capital, which is only 10 feet above the level of the sea, establish a mean temperature of 26° 2 (79° Fahr.). The winds are: the south in the rainy season, the east and northeast in October, November and December, then again the south wind, except in March and April, when the southeast prevails.

Herr Junker.—In a note on p. xxvii. of the *Bibliotheca Americana Vetustissima*, Mr. Henry Harrisse remarks that "There is no dedication to *Ander Schiffahrt's* 2d voyage;" which seems natural enough to those who know that Ander Schiffahrt was not a man, but a Second Voyage. Mr. Harrisse himself understands the case better to-day than he did when he made his note, and he will be glad to learn that his navigator is no longer condemned to a lonely life.

The March number of the Royal Geographical Society's *Proceedings*, has, on p. 189, a brief notice of a new work: "El Dorado. Geschichte der Entdeckungen nach dem Goldlande El Dorado im XVI. und XVII. Jahrhundert," by Ferd. Adalb. Junker von Langegg.

The reviewer says that *Herr Junker's* book is the result of great research. The judgment may be sound, but to turn the Junker von Langegg into Herr Junker is not less bewildering than it would be to speak of the

Baron of Bradwardine as Mr. Baron, or Lord Palmerston as Mr. Lord.

CARTOGRAPHY IN RUSSIA.—M. Venukoff contributes to the *Revue de Géographie*, for April, an account of the progress of cartography in the Russian Empire.

The earliest map is that of the Italian Battista Agneze. This was found in 1884 in the library of St. Mark, at Venice, where the MS. still remains. It is in Latin, and bears the date 1525; and it has never been printed. Twelve years after this Anthony Wid, a Pole, brought out a map of European Russia, with a portion of Siberia. This served as the basis for Sebastian Munster's map in the *Cosmographia*, as well as for those of the various editions of Herberstain's *Rerum Moscoviticarum*.

In 1562 Jenkinson published, in London, a very detailed map of Russia and Tartary, which was reproduced the same year in the Atlas of Ortelius.

At the end of the XVI. century appeared the map known as the "Great Plan." This has now disappeared, but it was probably the original of the work produced by Theodore, the son of the Czar Boris, and engraved in 1614. On this engraved copy the meridians and the parallels are marked, the latter at intervals of 87 versts, while at the present day the degree is equal to 104.6 versts.

Three different maps were published between 1609 and 1612 by Isaac Massa, and towards the end of the XVII. century Russian cartography was illustrated by the works of Rémésoff and those of Witsen, the Amsterdam burgomaster, and friend of Peter the Great.

Peter introduced European methods, and formed a corps of thirty pupils of the Naval Academy, who worked during the years 1725–1740 on the map of Asiatic Russia. Charts of the Caspian and the Black Seas, the Sea of Azof and the Baltic were drawn during the reign of Peter by officers of the navy; and in 1745 the Academy of Sciences published at St. Petersburg an Atlas of the Empire.

As late as the middle of the XVIII. century the state of education in the country was such that very few persons, even of those belonging to the highest social position, knew how to make use of a map. Fifty years after the death of Peter, Catherine II., presiding in the Senate at a discussion which required geographical information, called for a map of Russia, and was answered that the Senate did not possess one. She handed some money to one of the secretaries, and sent him to purchase a copy of the atlas, published by the Academy thirty years before. Several of the Senators confessed that they had never heard of this atlas, and that they could not have used it if they had had it.

The foundations for exact cartography in the empire were laid by Catherine, who ordered that topographical surveys should be made in all the European provinces. The result of this work, continued through many years, was an atlas that remained the standard authority down to the time of Nicholas.

Great progress was made in Siberia, also, during the second half of the XVIII. century.

In 1822 a special corps of military topographers was created; and a number of triangulations were undertaken and carried through in various parts of European

Russia and of the Caucasus. Topographical surveys were made in Asiatic Russia, and special maps were prepared of such remote regions as the Kirghiz steppes, the Altai and Transbaikalia.

At the middle of the present century, Russia possessed: 1. For half of the European provinces a map on a scale of 1/420,000, showing, besides the cities, all the villages and nearly all the roads, all the streams, etc. There were also topographical maps on a scale of 1/42,000 or 1/84,000, of Poland, the government of St. Petersburg, Esthonia, etc.

2. Maps, partly topographical, of the Caucasus, then not subjected to Russia.

3. For Eastern Russia and the Kirghiz steppes, a number of geographical maps on a scale of 1/840,000 or 1/2,100,000.

4. For the southern part of Western Siberia, a geographical map on a scale of 1/2,100,000; and for the Altai Mountains, where topographical surveys had been carried out in detail, some special maps on the largest scale.

5. For Eastern Siberia there was, in 1850, nothing but Podzniakof's map of 1827; but the topographical survey, begun in 1848, was progressing under the Governor-General Mouravieff.

The marine charts of this period were numerous and good, and among them M. Venukoff mentions that of the Baltic and the Gulf of Finland, by Sarytcheff, Capt. Manganari's charts of the Sea of Azof and the Black Sea, Kolodkine's chart of the Caspian, and those of the coasts of Kamtchatka and Nova Zembla, by Lütke and Pakhtoussoff. The Russian voyages of dis-

covery in various parts of the world, during these fifty years, added largely to the collections of original charts. In 1819-1822 Anjou and Wrangel mapped the north-eastern coast of Siberia.

The second half of the century began with the establishment of special classes of geodesy at the Staff Academy. From these officers were sent to the Pulkova Observatory for instruction in astronomy; and they were then assigned to duty in the various provinces. Gen. Stebnitzky, who is now at the head of the topographical section of the General Staff, was among the earliest of the students at the Academy. It is mainly due to his labors that the Caucasus, which was finally conquered only about twenty-five years ago, is now more thoroughly mapped than any other portion of the empire, with the possible exception of Poland.

Besides a number of sheets of the great topographical map, which represents the relief of the surface of nearly all the western provinces, or governments, there is a special atlas, on a uniform scale, of 1/420,000 for the whole of European Russia. This atlas, made under the supervision of M. Strelbitzky, is composed of 145 sheets, and gives all the villages and hamlets, with the number of houses in each one. It is brought out in two styles: one on copper, from which the forests are omitted, and one on stone, with the forests. This atlas is regularly revised and corrected.

Among the very numerous cartographical works of the Russian Staff, M. Venukoff especially recommends Col. Bolcheff's "General Map of Asiatic Russia," including, on a scale of 1/4,200,000 parts of Persia,

Afghanistan and India, with nearly all China and the whole of Japan. It is, in M. Venukoff's opinion, the best map of the northern part of Asia; and Matoussovsky's "Chinese Empire" is, he affirms, superior to any other map of China.

Besides the Russian seas, many of the lakes and the rivers have been studied and mapped by skilful hydrographers.

The Imperial Russian Geographical Society has published, at its own expense, Tutikoff's map of European Russia, Schwartz's Southeastern Siberia, Oulsky's Chart, showing the depths of the Caspian Sea, two ethnographical maps of European Russia, etc.

The special maps issued by the Departments of Finance, of the Public Domain, and of Statistics, have been brought together by Mr. Ilyin and published as a Statistical Atlas, illustrating the material and intellectual progress of the nation. Mr. Ilyin is also the publisher of Von Tillo's many admirable maps.

The Transcaspian Railway.—Mr. Curzon, M. P., has lately made a journey in Central Asia over Gen. Annenkoff's great railway, and his observations are reported in the *Proceedings* of the Royal Geographical Society for May. He fully recognizes the skill and energy with which the Russians have done their work, but he does not seem to have been impressed, as M. Leclercq was, by the extraordinary difficulties of the undertaking. The main obstacle, which will always constitute a danger to the line, was the shifting sand, blown by the desert winds. Apart from this difficulty, Mr. Curzon is disposed to think that the road was the easiest and simplest ever

built, the region traversed being as flat as a a billiard table for almost the entire distance of nearly 900 miles from the Caspian Sea. The journey is made in 72 hours. At the stations along the road, 61 in number, good refreshments are to be had, with very fine watermelons at less than 1 d. apiece, and grapes for a third of a farthing per lb. On the Kara Kum, the sights were an occasional group of Turkoman tents, the small clay watch-towers and the rectangular forts, and, more rare, the circular barrows or *kurgans.* The moving objects were, here and there a crow, or a camel, and the frequent sand columns caught by the wind and sent, giddily revolving, across the plain. In the distance a perpetual mirage converted the wilderness into lakes of water and floating islets of trees.

Merv, which fills so large a space in imagination and in books of travel, is a little place of two or three streets, and about 1000 inhabitants, but the country for miles around is covered with the ruins of the three ancient cities that bore the name. The desert beyond the oasis, which has an area of about 1600 square miles, is characterized as an "appalling" ocean of sand.

Gen. Annenkoff's bridge over the Oxus, built, as Mr. Curzon says, in 103 days, is, necessarily, a temporary structure of timber.

Bokhara, nominally independent, is to be regarded as a part of the Russian dominion in Asia. For the 150 miles between the capital and Samarkand, the terminus of the railway, the land is one fruit garden.

The military and political significance of the Transcaspian road naturally has an interest for Mr Curzon, but he remarks that its immediate effect has been to se-

cure to Russia the advantage over England in the competition for the trade of Central Asia.

THE OASES OF SOUTHERN TUNISIA.—The *Compte Rendu* of the Paris Geographical Society for the 1st March, reports an address made by M. Ed. Blanc, who went to Tunisia in 1885 to study the problem of arresting the encroachments of the sand dunes on the oases in the South. The methods which had proved successful on the French coasts were, he found, not applicable in Tunisia, with the immense expanse of the sand, its dryness and mobility, and the violence of the winds, added to the scarcity of materials for the work and the want of water, which made it impossible to consolidate the shifting sands by means of plantations. One by one these difficulties were overcome.

M. Blanc described four groups of oases, the Aarad, the Djérid, the Nefzaoua, and the fourth composed of the oases situated on the prolongation of the line traced by the southern base of the Aurès Mountains. Remarking the contrast between the richness of these fertile spots and the sterility of the surrounding desert, in which, nevertheless, the numerous Roman ruins proved that different conditions once existed, M. Blanc was led to consider the causes which had brought about so great a transformation. He did not believe this was due to the destruction of irrigating works, nor to the alternation of periods of drought with periods of humidity; and still less did he accept the theory that man had wrought the desolation by cutting down the forests. He believed the aridity of the Sahara to be the result of general geographical causes brought into action by

modifications in the very form of the continents, such as the elevation of the Central Asiatic steppes and the progressive disappearance of the snows that covered during the glacial period many of the mountains in Europe, and, perhaps, also in Africa.

It will not recommend M. Blanc's explanation to all men to add that he attributed part of the effect to the subsidence of Atlantis. These various causes, he argued, diminished the quantity of moisture brought by the winds to this part of Africa, and, the equilibrium once broken between the amount of the rainfall and the evaporation, there ensued a progressive aridity now practically beyond remedy.

If not to be cured, the sterility of the desert may yet be modified by means of artesian wells. It must be remembered, however, that the supply of water from this source never can be very great, since the establishment of a second well in the neighborhood of the first sensibly diminishes the yield of this one; and irrigation of the whole country is, under the circumstances, an impossibility. The consumption of water for irrigating purposes in the oases is, on an average, about three-fourths of a pint per second for every hectare (about two and one-half acres). At this rate there would be needed for the yearly irrigation not less than forty inches of water, or ten times the amount of the rainfall; and this is evidently far greater than any possible supply from artesian wells.

A real transformation of the Sahara into a region susceptible of cultivation may be looked for, in M. Blanc's opinion, when the progress of science shall have found the means of subjecting and utilizing the great

natural forces, such as the rise and fall of the tide, which is strongly marked in the Gulf of Gabes, and the solar heat, and applying them to the distillation of fresh water from the sea. The problem, in either case, is theoretically simple, and the practical solution of it can only be a question of time.

SLAVERY IN THE CONGO STATE.—E. F., who may or may not be Ernesto Farina, writes in the *Bollettino* (Marzo-Aprile) of the *Società Africana d' Italia* that slavery exists in the Congo Free State, having been gradually established on the upper river; and he refers to one Station near Stanley Falls which has enjoyed the distinction of being less expensive to the State than others, for the reason that labor at this Station was wholly performed by slaves. When the Arabs captured Stanley Falls in 1886, some of the Houssas (Hausa) escaped in a canoe, and were taken by the natives at Upoto. A Government steamer, sent for the purpose, recovered all but two or three of these men, and the officers purchased (*redeemed* is E. F.'s milder term) from the Upoto people some of their own slaves. These slaves the officers set to work at the Station. Other fruitless visits were made in search of the Houssas, (who, as British subjects, could not be abandoned to slavery) and at every visit the number of slaves offered for sale on the river bank increased. These were purchased by the Belgian agents for cotton goods, brass, iron wire, and the like. The trade went on, till one day the Government steamer arrived towing a large number of canoes filled with black soldiers. These landed under the protection of the steamer's guns, attacked and burned an Upoto village,

and carried off thirty-five or forty women and children. These were taken to the Station and made to work for their captors, until they were ransomed at the rate of four slaves for a woman and two for a child. There are still other ways of procuring slaves. A European on a hunting excursion, wounds an animal, which escapes, but is afterwards found by some natives, who take the flesh for their own use, according to the native custom. The Belgians demand payment for the animal, and the natives refuse to pay; and the Europeans resort to their unfailing argument.

It is falsely affirmed, according to E. F., that the slaves are better treated by the Belgians than by their native masters, and he recites the following instance:

A Belgian officer one day condemned a native woman, his personal slave, to be held face downward by four Houssas while a fifth flogged her with a whip of hippopotamus hide. The officer stood by and saw this done. A missionary, who heard of this infamous act, reported it to the Governor-General, but the officer kept his place.

E. F. has made several mistakes. In a matter so grave he should have given his full name, although the *Società Africana d' Italia* answers for him.

He should also have given the names of the Governor-General and the missionary and the Belgian officer, and, if he had them, the dates of the abominations he describes. To know of such things, and to spare in any way the men who do them is to be guilty of treason to humanity.

The civilized world is responsible for the establishment of the Congo State, and it is impossible to read without shame, in the light of E. F.'s revelations, the passage on p. 67 of the same *Bollettino*, in which Vice-

President Florenzano declares that the European activity in Africa is "*the development of the right inherent in the higher races to civilize and to improve those that are below them.*"

THE NEWS FROM STANLEY.—Letters received in London, on the 1st of April, told of Stanley's safety; and one of these, published simultaneously in the *Proceedings* of the Royal Geographical Society and in the *Scottish Geographical Magazine*, gives the details of the extraordinary journey through the Central African wilderness.

For the hardships endured and the dangers encountered this journey resembles the yet longer and more perilous march of Gonzalo Pizarro to the Napo and the Amazon.

The expedition left Yambuya on the 28th June, 1887, with 389 rank and file and 180 supernumeraries.

The objective point was Kavati, 322 geographical miles almost due E. from Yambuya, and the intervening country was absolutely unknown. On the 15th of December, after toiling through a seemingly endless forest and fighting with the natives and enduring many losses by disease and privation, the party reached a point whence they looked down on the Albert Nyanza, nearly 3000 feet below them. Here the opposition of the natives turned them back, and it was not till the 29th of April, 1888, that Stanley finally met Emin Pasha and Capt. Casati. He left them again on the 25th of May.

Following the Aruwimi River from Yambuya, Stanley traced it up to its source, on the edge of the Albert

Nyanza, and 800 miles from the Congo. He found that the Nepoko was a tributary of the Aruwimi, and that this, like so many other African rivers, bore many names. For 300 miles from its source it is called the Ituri, then, successively, Itiri, No-Welle, Nevoa, Suhali and Biyerre; all marked on Stanley's map, sent with his letter. Another name, *Dudu*, is omitted. For nearly the whole distance travelled the river flowed through an immense forest, like those of South America and Farther India, swarming with animal life and matted with vegetation. The picture of it is impressive:

"Take a thick, Scottish copse, dripping with rain; imagine this copse to be a mere undergrowth, nourished under the impenetrable shade of ancient trees ranging from 100 to 180 feet high; briers and thorns abundant; lazy creeks meandering through the depths of the jungle, and sometimes a deep affluent of a great river. Imagine this forest and jungle in all stages of decay and growth—old trees falling, leaning perilously over, fallen prostrate; ants and insects of all kinds, sizes and colors murmuring around, monkeys and chimpanzees above, queer noises of birds and animals, crashes in the jungle as troops of elephants rush away; dwarfs with poisoned arrows securely hidden behind some buttress or in some dark recess; strong, brown-bodied aborigines, with terribly sharp spears, standing poised, still as dead stumps; rain pattering down on you every other day in the year; an impure atmosphere, with its dread consequences, fever and dysentery: gloom throughout the day, and darkness almost palpable throughout the night. . . . .

"The mornings generally were stern and sombre, the sky covered with lowering and heavy clouds; at other times thick mist buried everything, clearing off about 9 a. m., sometimes not till 11 a. m. Nothing stirs then; insect life is still asleep; the forest is still as death; the dark river, darkened by lofty walls of thick forest and vegetation, is silent as a grave; our heart-throbs seem almost clamorous, and our inmost thoughts loud. If no rain follows this darkness, the sun appears from behind the cloudy masses, the mist disappears, life wakens up before its brilliancy. Butterflies scurry through the air, a solitary ibis croaks an alarm, a diver flies across the stream, the forest is full of a strange murmur, and somewhere up the river booms the alarum drum." . . .

Out of this dense growth the expedition came at

once upon open, grass land, that stretched to the height above the Albert Nyanza. Stanley reports that this lake is rapidly decreasing in size. This decrease is due, he says, to the wearing away of the reefs that obstructed the Nile below Wadelai.

Just after parting with Emin, on the shore of the lake, Stanley saw, quite fifty miles away to the southwest, a snow-covered mountain, higher and more regular in outline than Mt. Gordon Bennett, discovered and unfortunately named by himself. This higher mountain may be, he writes, the Ruwenzori, "which the natives said had something white like the metal of my lamp on the top."

He looks upon the country lying between the Albert Nyanza and the lake he discovered in 1876 (the Muta-Nzige) as promising curious revelations; and he declares himself uncertain, at the time of writing (Sept. 1, 1888), whether the Muta-Nzige belongs to the system of the Nile or to that of the Congo.

If this letter has dispelled some of the apprehensions felt with regard to Stanley and to Emin Pasha, it still does not tell a complete story. The march to the Albert Nyanza was undertaken, as the world believed, to rescue Emin Pasha and his faithful comrades from deadly peril. Nothing is said of this peril in the account of the meeting; nor, though Stanley passed four weeks with Emin and Casati, could either of them find time to write a letter, or to send a message to his friends in Europe. These omissions do not explain themselves; neither is it easy to understand why, if any information was to be given, the outside world should have been left to guess at the plans and the future

movements of the rescuer and the rescued. It is possible that the real purpose of Stanley's expedition has never been told.

THE PORTUGUESE IN NYASSA-LAND.—Under this title, Mr. J. Batalha-Reis, of the Lisbon Geographical Society, contributes to the *Scottish Geographical Magazine*, for May, a compact and solid article on the Portuguese priority of right as discoverers and explorers in the vast region of Central Africa, somewhat vaguely described as Nyassa-Land. Mr. Batalha-Reis wastes no sentiment on the matter, but proves, by citations of chapter and verse from books within reach, that his countrymen, in the sixteenth and seventeenth centuries, knew and visited the Shire River and the Nyassa Lake. He shows, also, that the Portuguese Government has always made its authority felt in the far interior, and that the native chiefs, whether submissive or antagonistic, have never ceased to recognize the Portuguese power.

All this is, without doubt, an old story to those who have paid some attention to the history of the early explorations in Africa; but it was necessary to state it once more, and especially in English, first of all, because as Eulenspiegel says, "that which is known from of old doth no man regard," and next, because Englishmen having designs of their own on Nyassa-Land choose to pretend that Portugal has no rights in that part of Africa.

Most English-speaking persons are content to err with Livingstone on this subject, and Sir Richard Burton might well have been more severe when he wrote: "With the greatest admiration of Dr. Livingstone's

thoroughness, I am compelled to own that he has done scanty justice to that little, but heroic, nation which pierced for Europe a new pathway to the East. In fact, the very mention of Portuguese explorations seems to act upon him as a red rag," (quoted by Mr. Batalha-Reis, on p. 260).

It was eminently fit that an unanswerable statement of the historical truth concerning these matters should appear in the *Scottish Geographical Magazine*, which published about a year ago (in Vol. IV., p, 305) the opinion, no less cautious than courageous, that "German claims might be satisfied, and Portuguese claims should be overlooked, in securing the free navigation of the Zambesi to the flags of all nations."

LOURENÇO MARQUES.—Besides the railroad which is to unite it with Pretoria, in the Transvaal, and the electric lights for which the Town Council has invited tenders, Lourenço Marques has other cares. It has just been threatened with a revolt of the Hindoos, who hold so much of the East African trade in their hands.

The movement on the part of the Banians was serious enough to justify the issue of supplements to the handsome weekly paper, *Districto de Lourenço Marques*, but the provoking cause of the disturbance has its humorous side.

On the 11th of March last the Town Council made an ordinance requiring the Banians and the native Africans, in the interest of public decency, to wear trousers. The Africans received the order with bare indifference, but the Hindoos took it as an affront, and appealed, after much turmoil, to the Governor-General of the Prov-

ince, who telegraphed a message to suspend the execution of the decree. Upon this the Town Council met in extraordinary session. Many speeches were made, and a flood of light was thrown upon the historical relation of Hindoos to trousers, and, finally, the Council unanimously re-affirmed the ordinance. The Governor-General was duly informed of this action, and gave way, leaving the municipality to manage its own affairs.

THE ASCENT OF KILIMANJARO.—On the 12th of November, 1888, Mr. Otto E. Ehlers set out in company with Dr. Abbott, an American naturalist, to make the ascent of Kilimanjaro. In his lively account, published in *Petermanns Mitteilungen*, 35 Bd., III., Mr. Ehlers says that he was delighted to have a companion, because four eyes see better than two, while hardships are diminished by half and enjoyments increased tenfold, and, finally, because in Africa, more than anywhere else, it is the traveller's duty to neglect no one matter of interest that may present itself.

The first camp was at the foot of a small crater to the south of Kimawenzi, which lies E. of Kibo, the higher summit. The night was cold—they were at an elevation of 9800 feet—and the next morning one of the three native soldiers, whom Mr. Ehlers had provided a few days before with warm clothing, quietly stole away, clothes and all. Mr. Ehlers consoled himself with a quotation from Faust ; and the other soldiers lost no time in following their comrade.

As a preliminary training for Kibo, Mr. Ehlers climbed Kimawenzi to a height of more than 16,000 feet. To go higher than this on a mountain so jagged,

and so cut up by deep gorges, he believes to be, though he will not say it is, an impossibility. In the afternoon of this day three antelopes of a new species were seen, at a height of nearly 12,000 feet. The next two days were passed in reconnoitring and in collecting specimens. The third day a place was selected for a camp, and here fifteen of the men were left; ten were sent back to Marangu for supplies, and, with five others, Mr. Ehlers and Dr. Abbott set out for the snow region. They came upon it very soon, for during the night snow had fallen, and their men were at first like children in their pleasure at the sight, though their bare feet soon began to suffer, and they cried out that they were going to die. They kept on, however, stoutly enough, till their advance was stopped by a precipice, and Mr. Ehlers found he had repeated Dr. Meyer's mistake of taking a path that led towards Kimawenzi. They encamped for the night, and had hardly done so when there came on a snow storm as furious as any ever known in the far North. The next morning was splendidly clear, with a still air and a cloudless sky. After crossing some lava ridges, the travellers passed to the north of the chain of hills between Kibo and Kimawenzi. The snow was six inches deep on the loamy ashes, over which they slipped and struggled. The night of the 17th, when the last camp was reached, was still, with bright moonlight; and the next morning the road was plain and smooth as a floor over the hard, frozen surface. Before long, however, this was succeeded by blocks of lava and hills of ashes. At 7 o'clock the two explorers had reached an altitude of 17,000 feet, and enjoyed a magnificent view of the great

Masai plain below them, stretching northward from Kibo. Here Dr. Abbott's strength failed, and Mr. Ehlers had to go on alone.

He had climbed a thousand feet higher, and had just comforted himself with a pull at the brandy flask, to the health of a distant person, when his *alpenstock* slipped from his hand, and lodged nearly 200 feet below him. He recovered it, thinking meanwhile how slight a thing, in such a place, might reduce him to helplessness. About 10 o'clock he reached the ice-cap, that covered the mountain top. It was impossible to climb this wall of ice, and, after turning around it, he descended the mountain for some distance, and found on the N. W. side an approach that gave him a wide view of the summit. There was no sign of a crater, but the undulating surface lay before him covered with snow.

Mr. Ehlers finds that the measurements made by Dr. Abbott and himself do not agree with those of Dr. Meyer, but he is convinced that the mountain is nearly 20,000 feet high (6000 metres). At 16,400 feet he found the tracks of an elephant, besides those of antelopes and buffaloes, as well as the last sign of vegetation in a species of everlasting flower.

Den östgrönlandske Expedition udfort i Aarene 1883–85, under Ledelse af G. Holm. 2 vols. Kjöbenhavn, 1888; (*with French Résumé of the 2d vol.*) from the author.

Capt. Holm's book gives an exhaustive account of Eastern Greenland, its geography, geology and ethnography, and it is not easy to believe that there remains much to be gleaned after him and his fellow-workers in the expedition of 1883–85. The opening dissertation on

Ósterbygd (of which no traces were found) is by Dr. Steenstrup, the report on the expedition and the geographical description are by Capt. Holm and Lieut. Garde, the geology is treated by Drs. Knutsen and Eberlin, the botany by Prof. Lange, and the comparative study of the meteorological observations is made by Prof. V. Willaume-Jantzen. In Vol. II., Dr. Sóren Hansen writes of the anthropology and Capt. Holm of the ethnology. Mr. Johannes Hansen is responsible for the list of the inhabitants. Dr. Rink explains the East Greenland dialect, and adds valuable notes to the legends and tales collected by Capt Holm.

The coast has been carefully mapped from Cape Farewell in 59° 49′ up to 68° 45′ N. Lat., including the numerous *fiords* that run so far into the land.

East Greenland as defined by Capt. Holm has five natural divisions, marked by points along the coast. These are: from Cape Farewell north to Auarket, from Auarket to Ikermiut, from Ikermiut to Igdloluarsuk, from Igdloluarsuk to Inigsalik, and from Inigsalik to the point where the exploration ceased. In the second and the fourth divisions, the land ice comes down to the edge of the water, but in the other three the *fiords* are walled in by high and steep mountains. The general direction of the *fiords* towards the sea is a little south of east, while on the west coast of Greenland the direction is south-westerly.

The most interesting part of the work is that which describes the inhabitants of Angmagsalik, a region lying between 65° and 66° N. Lat. These people had never come in contact with the civilized world until they were visited by Capt. Holm's party.

They number 548 persons, 245 of them males. In stature they exceed the Greenlanders of the south and west, the average height of the Angmagsalik men being about 5 ft. 3 in., and that of the women not quite 5 feet. They are fairly well developed in the upper part of the body, but the legs are short and thin and comparatively weak, and Capt. Holm is disposed to think that this feebleness is due to the close confinement and cramping of the limbs on board of the *kayaks*, in which the men pass their days.

The complexion of these East Greenlanders is a yellowish brown, lighter in the women than in the men. Their eyes are brown, and the hair, which is thick and smooth, is dark brown or black.

The climate is milder than that of the western coast, but the vegetation is almost confined to heaths and mosses. The sea furnishes the principal means of subsistence. The only domestic animal is the dog.

The people call themselves *Inik*, or *Tâk*, that is, *men*. In the winter they live in houses made of stone and turf, with but one room, from 24 to 50 feet in length—according to the number of families united in it—and from 12 to 16 feet in width. The site is generally a sloping ground near the sea, and the windows look out on the water. As many as ten families sometimes occupy the same house, and the oldest man is regarded as the head, if he has been or is a good hunter, and has sons distinguished in the same way; and this is the only distinction recognized. When the spring comes, and the tent life begins, the large community separates, and none but the kindred remain together. The inhabitants of one house

are often at enmity with those of another; which looks like civilization.

Theft is not uncommon, and murders are frequent, for so small a population. There is no public recognition of these crimes other than the songs sung alternately by the parties on both sides, in the presence of an audience, which approves or disapproves. Between the songs, the adversaries display no ill-will, but treat each other as if there were no cause of trouble between them.

These contentions, with the accompaniment of the drum, are not decided by one trial, but are repeated very often, so that they sometimes last for years.

The ties of blood impose the obligation of mutual help. On the other hand, marriage is not held to be a family tie, and the wife is treated as a servant to be dismissed at pleasure. If she has a child, her position is more secure. The men marry as soon as they are in a position to maintain a wife. Skilful hunters have often two wives, but there is no instance known of a greater number.

Longevity is not common in East Greenland. Six or eight persons, and certainly not more than ten, are supposed to have reached the age of from 60 to 70 years. When a man dies, the body is dressed in the best winter clothes, the head is covered with a hood, and the legs are tied together. The corpse is then dragged out of the house by the ordinary passage, or through the window, and thrown into the sea, or left for the tide to carry away. If the sea is frozen, the body is pushed through a hole in the ice. Sometimes the burial is after the ancient fashion of laying the body on the rocks, and covering it with stones; but in either case the weapons

and tools of the deceased are laid near him. Mourning for the dead is manifested by lamentations and groans, and abstinence from certain indulgences; and the name of the dead man must not be pronounced. Any one who bears the same name must find another; and if the deceased was called by the name of an animal, or an object, or an idea, the word must be changed. These changes being accepted by all, it follows that the language undergoes great modifications.

Man is composed of three parts: the body, the soul, and the name (*atekata*). The body, of course, is perishable. The soul, which lives in the man, is extremely small, not larger than a finger or a hand. If it falls sick, or dies, the man goes with it. When the man dies, the soul returns to life, either in the sea or in the air. Both are good places, but the sea is to be preferred.*

The *Atekata*, or name, is as large as a man, and enters into the child when it is born and rubbed around the mouth with water, while the names of those after whom it is to be called are pronounced. When a man dies, the *Atekata* stays near the body until a child is named after the deceased. It then enters into the child and continues its existence. Children that die, whether naturally, or by violence, go to heaven and there produce the *Aurora Borealis*, which is called after them.

---

*Capt. Holm quotes from Johannes Hansen, on this subject: "(They believe that) a man has many souls. The largest live in the throat and in the left side of the man, and are little men about the size of sparrows.

"The other souls, which are of the bigness of a finger-joint, live in the other parts of the man's body.

"When the *Angekoks* (sorcerers) take away one of the souls, the part of the body thus treated falls sick. If another *Angekok* finds the soul and restores it to its place, the man regains his health; but if this cannot be done, the man dies and the soul goes off on its wanderings."

There is a story among these Eskimos that Greenland is an island, and that long ago a man named Uyartek went round it. It is hardly credible that people in their state of intellectual development should be able to conceive the idea of a vast territory like Greenland, with its relation to the sea and to other lands, and the story is, most probably, to be understood of some island on the coast.

It is to be hoped that this very interesting book may be made accessible to a larger public in an English or a French translation, with the numerous illustrations, almost uniformly excellent, and the maps, which are beautiful specimens of work.

Geografia Etnologica e Storica della Tripolitania, Cirenaica e Fezzan, con Cenni sulla Storia di queste regioni e sul silfio della Cirenaica, per Ferdinando Borsari, (*from the Author.*) *Napoli, 1888.*

Professor Borsari says in his preface that, looking to the probable changes in the near future in the relations of the lands lying between Tunisia and Egypt, he felt that some such work as this was especially called for in Italy. He regrets his own shortcomings and the unavoidable breaks in the narrative, not to be filled up until the regions to the east of Tunisia have passed under the control of some enlightened government. If the present work finds favor, the author will bring out another on the physical and economical geography of these countries, illustrated by a geographical and historical map. Such a task could not be put into better hands, and Prof. Borsari would do a kindness to students of all nations by completing

what he has so well begun. His book has been called a compilation. It is a compilation, so far as the name implies industry on the part of the writer; but it is also an independent and critical work, in which the author has used and systematized materials, has rejected and interpreted authorities, and has brought the whole into order with adequate learning and judgment. There are persons who weary of meeting the same names in history, and are ready to quote Emerson without understanding him: "How often must we say Rome and Paris and Constantinople!" True; but if you will read what men have done you must read these names, and others. In writing of the Mediterranean lands, once so highly civilized, Prof. Borsari has to go to the fountain head.

He begins with the megalithic monuments, and then considers successively the fair-haired Libyans, the origin of the Libyans, the North-African ethnology, the Berber language and the Berbers (whose Vandal origin he rejects), and the present inhabitants of Tripolitania, Cirenaica and Fezzan.

* The historical portion of the geography is studied with the same care, and the descriptions of the Syrtes, the mountain-systems and the hydrography bring to-

* In a reference to Pindar, on p. 75, Prof. Borsari quotes from Giosuè Carducci a passage in which the Italian poet has repeated, consciously or unconsciously, Gray's superb lines:

"Or the pride and ample pinion
That the Theban eagle bear,
Sailing with supreme dominion
Through the azure deeps of air."

Carducci:

". . . . aquila trionfale
Distende altera e placida il remeggio de l'ale
Ne 'l fulgente meriggio su i fôri e le città."

gether in a few words what is known concerning these subjects.

There are two bibliographical lists and one table, the preparation of which must have cost great labor. This table shows in parallel columns the names of places from Scylax, Strabo, Pliny, Ptolemy, the Antonine Itinerary, the Peutingerian Table, the Stadiasmos of the Great Sea and the Ravenna Cosmographer, and identifies them, as far as possible, with the modern names.

The publisher has brought out the book in excellent style.

Kimbundu Grammar. Grammatica Elementar do Kimbundu ou Lingua de Angola por Héli Chatelain. (*from the Author.*)

Genebra, 1888–89.

Mr. Chatelain is a native of Switzerland, a missionary and a trained scholar, who visited Angola in 1884, and acquired the language. His grammar is designed for the use of the natives and of missionaries in West Africa, and is, therefore, written in Portuguese; but most of the words and phrases are also explained in English.

Mr. Robert Cust, who speaks with authority on the languages of Africa, writes a brief introduction to the *Grammatica.* He shows the importance of the Bunda, or Ki-Mbundu, tongue by describing it as the *lingua franca* of Western South Africa; and he expresses the highest regard for Mr. Chatelain's work as a teacher, and for his character as a missionary of a singularly devoted and self-denying spirit.

Nouveau Dictionnaire de Géographie Universelle.

The fourth volume, now well advanced, of this great work, in which M. Vivien de Saint-Martin has had the able assistance of M. Louis Rousselet, shows no diminution in the qualities that have marked it from the beginning. It is the misfortune of encyclopædias and of dictionaries that they are part of the human history, which moves straight forward on a continuous line, without regard to arbitrary limits, so that, as M. Renan has said, all history must be rewritten every hundred years. The term allowed to an encyclopædia, even of a special branch, is yet more brief; but for the thoroughness of its treatment and the accuracy and the care with which its statistical information is brought together, the *Nouveau Dictionnaire* keeps and deserves a foremost place among geographical works.

La Tunisie, Géographie, Événements de 1881, *Organisation Politique et Administrative, Organisation Judiciaire, Instruction Publique, Finances, Armée, Commerce, Industrie, Travaux Publics, Système Monétaire, Par Amédée Rivière. Préface par M. Albert Mailhe.*
Paris, 1887.

This is the comprehensive title of a book which contains 150 12mo. pages, including the preface. In this, M. Mailhe allows his regard for the author to carry him a little too far, when he affirms that this precious work leaves nothing to be told concerning Tunisia and its people. A similar claim is made by every enterprising publisher of an encyclopædia; and *La Tunisie* has the merits and the defects of an article written for such a publisher. A few of the subjects are treated at length,

other are briefly dismissed, and some that should appear are omitted. There is, for instance, not a word on the ethnography of the country.

No fault could have been found with M. Rivière if he had said nothing about the steps which led to the occupation of Tunisia by the French; but he has chosen to tell the story with so many suppressions that his readers cannot go with him.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

AMSTERDAM.—*Kon. Nederlandsch Aardrijkskundig Genootschaap, Tijdschrift.*

An answer to Dr. J. Lorié, by K. Martin—Some Geological Observations in the Neighborhood of Baarn—Schokland (island in the Zuyder Zee)—The Talaut Islands (a group N. E. of Celebes)—Flores—Communications respecting the Hemenway Expedition, (by Dr. H. F. C. Ten Kate, Jr.,)—The Argentine Republic in its Relations to Commerce and Emigration—The Influence of Forests on the Rivers of Middle Europe.

BERLIN.—*Gesellschaft für Erdkunde, Verhandlungen.*

The German Protectorate in South-western Africa—The Final Results of the Investigation of the Krakatoa Phenomena—Dr. Hettner's Second Report on his Travels in Peru and Bolivia—On the Origin of the name "America."

Deutsche Kolonialzeitung.

African Soil and Land (by P. Reichardt)—A Visit to Hendrik Wittboy, the Hottentot Messiah, in the Summer of 1888—Prof. Sering on Col-

onization and the German Element in North America—Lake Nyassa—The Arabs in Central Africa—A German Protest against Slavery 200 years ago—The White Book on Samoa—African Land and Soil (by A. Merensky)—Bagamoyo—The Latest Regulations of Brazilian Immigration-Policy—A New "South-African Committee," and the Feeling at the Cape (by Karl Blind)—The German in Kaiser Wilhelmsland in his attitude towards the Natives—Propositions for a practical Colonizing Occupancy of East African Possessions—The Situation on Lake Nyassa—What is to become of the Freed Slaves—A German Settlement on the Orange River—Matabele Land and the Boer Free State—The Control of the German Emigration—Colonization in the Grand Style—Stanley's Expedition—Otyimbingue (Damara Land)—The Italians in Somali Land—What does the Koran say of Slave-hunting and Slavery?—The First Travels of Europeans in our South-west-African Protectorate—The Commerce of the Congo State and the Congo Railway.

BRUSSELS.—*Société Royale Belge de Géographie, Bulletin.*

The Exploration of the Ubangi-Dua-Koyu (by Capt. Vangèle)—From Tiflis to Samarcand (by Jules Leclercq).

Le Mouvement Géographique.

The Origin of the name "America"—Lake Shambara and the Uma River—Events at Zanzibar—Exploration of the Kasaï and its Affluents

by the steamer "Roi des Belges"—Stanley to the Rescue of Emin Pasha—The Lomami: a newly discovered Water-way bringing steamers within three days of Nyangwé—The Muta-Nzige Problem—The Sources of the Nile—The Congo Railway.

BUDAPEST.—*Société Hongroise de Géographie, Bulletin.*

John Hunfalvy (founder of the Society)—Hungarian Women known as Travellers.

EDINBURGH.—*The Scottish Geographical Magazine.*

Islands of Melanesia—Dr. Livingstone and Lake Bangweolo—On the Earthquake Shocks Experienced in the Edinburgh district on Friday, January 18, 1889—Explorations in the Atlas Mountains—Lapland and Siberia by way of the Arctic Sea—The Eskimo Tribes—Leadville, Colorado—Letter from Mr. H. M. Stanley to the Royal Scottish Geographical Society—Samoa—The Portuguese in Nyassa-Land.

GOTHA.—*Petermanns Mitteilungen.*

The Ethnographic Relations of Macedonia and Old Servia—My Ascent of Kilimanjaro (Otto F. Ehlers)—The Soil of German East Africa—The South-west-African Protectorate—The New Map of Africa on a Scale of 1/10,000,000 (Stieler's)—The Latest Danish Explorations in Greenland—Geographical View of the Flora of Schleswig-Holstein—The Region at the Source of the Eastern Arm of the Tigris.

LÖCSE (HUNGARY).—*Ungarischen Karpathen-Vereines, Jahrbuch des.*

A Winter Tour in the Tátra Range (Western

Carpathians)—An Alpine Village in the Upper Tátra—Prehistoric Spots in the County of Liptau—Art-Monuments of the Middle Ages in Löcse—Travels in the Carpathians by Land and Water—Excursions in the Tátra Range of Liptau and Galicia.

LONDON.—*The Royal Geographical Society, Proceedings.*

The Gran Chaco and its Rivers—Explorations in the Glacier Regions of the Selkirk Range, British Columbia, in 1888—Explorations on the Chindwin River, Upper Burma—Letters from Mr. F. C. Selous on his Journeys to the Kafukwe River and on the Upper Zambesi—Formosa: Characteristic Traits of the Island and its Aboriginal Inhabitants—Letter from Mr. H. M. Stanley, on his Journey from Yambuya Camp to the Albert Nyanza—The Transcaspian Railway—The River Antanambalana, Madagascar.

NATURE.

Structure, Origin and Distribution of Coral Reefs and Islands—The Gradual Rising of the Land in Sweden (Nordenskiöld)—The New Traveller's Guide to Scientific Inquiry—The Geographical Results of Mr. Stanley's Expedition—The Surface of the Earth—Notes on Stanley's Journey—Further Notes on the Geology of the Eastern Coast of China and the adjacent Islands—Rain Clouds on Lake Titicaca.

MADRID.—*Revista de Geografia Comercial.*

Spanish Commerce with Morocco—Render unto Cæsar that which is Cæsar's—The Philippine

Islands, as seen by a Foreign Writer (Blumentritt)—The Province of Pontevedra.

MILAN.—*L'Esplorazione Commerciale.*

Massowah as a Colony—Military Operations against the Abyssinians and our Colonial Native Troops—Atlantis (suggested by Joaquin Costa's study in the *Revista de Geografía Comercial*, of Madrid, 1886)—Laos and Camille Gauthier's Exploration—African Notes—Correspondence from Tripoli—Letters from Harrar.

NAPLES.—*Società Africana d'Italia, Bollettino.*

Harrar—An Expedition to Eastern Africa—A Reconnaissance in Keren—Western Africa—Capt. Wissmann in the Reichstag—From the Bight of Biafra—From Saati to Metemma—The Senusi in History and Geography—Mozambique, Delagoa Bay and Natal—Slavery and the Congo State.

NEUCHATEL—*Société Neuchâteloise de Géographie, Bulletin.*

Downs, and their Formation—Maria Island (E. coast of Tasmania, near Darlington)—The Somali—Travels among the Bogos and in Northern Abyssinia—The Old Roads and the Old People of Val-de-Travers (in the Swiss Jura)—The Seventh Congress of the Swiss Geographical Societies.

NEW YORK.—*Science.*

An Agricultural Map of North America—Resources of the Nyassa Region—The Adirondack Forests—West Indian Hurricanes—Stanley's Let-

ter—Exploration in Mexico—Railways in China—The Explorations of Capt. Binger (in the French Sudan).

PARIS.—*Société de Géographie, Compte Rendu.*

The Oases in the Southern Part of Tunisia—The Application of Photography to Geography—The City of Sobral (province of Ceará, Brazil)—Memoirs of the Topographical Section of the Russian General Staff—Map of the Pamir—Russian Geographical Expeditions—Oceanography—Geography in Russia—Borings for Artesian Wells in the Sahara—The French Sudan—Taupin's Exploration in Laos—Cambodia—The M'Zab and the Beni M'Zab (in the Algerian Sahara).

RIO DE JANEIRO.—*Revista do Observatorio.*

The Origin of Meteorites—Climatological Review of the Month of January, 1889—Aspect of the Heavens during March and April, 1889.

ROME.—*Società Geografica Italiana, Bollettino.*

The Teleki Expedition—Researches in the Archives of Savona—The Earthquake in Liguria in 1887—Memorial Notice of Cesare Correnti—Physical and Social Conditions of Paraguay—A Skull from Somali Land—A Bushman Picture—The Rio Branco (or Parima) Brazil—A Pilgrimage from Bordeaux to Jerusalem (following the Bordeaux Pilgrim, A. D. 333)—The New Course of Historical Geography—On Some Cities of Spain and Portugal.

TURIN.—*Cosmos.*

Notes of a Journey from Shoa to Assab—Progress

of British New Guinea in 1887, from the Official Report of the Special Commissioner—The Aru Islands (80 m. South-west of New Guinea) and the Maclay Coast, in German New Guinea.

VIENNA.—*Kais. Königl. Geographischen Gesellschaft, Mittheilungen der.*

Death of the Crown-Prince, the Archduke Rudolf—On Determinations of Gravity—Travels in German East Africa—Statistics of the Italian Colonies in Rio Grande do Sul (Brazil)—The Subterranean Streams of Inner Carniola—The Rudolf-Grotto in Küstenland (the Adriatic Coast and Islands)—The Nicobar Islands and their People—Two Maps of the Surface-Level of France.

Deutsche Rundschau für Geographie und Statistik.

A Critical Excursion in the Doctrine of the Four World-Periods of Indian Brahmanism—Maghreb, the Land of the Setting Sun—A Visit to Corea—The Scientific Bases of Business Geography—From Leh in Ladak to the Pangong Lake (Tibet)—The Mammoth Cave—Virchow's Investigations concerning the Anthropology and Early History of Egypt—The Eruption of Krakatau and the Cloud-Glows—The Aschinof Expedition—Prjeválsky—Travels in the Crimea—The Kerguelen Islands—Stanley's March to Emin Pasha.

WASHINGTON LETTER.

WASHINGTON, JUNE 15, 1889.

TOPOGRAPHIC MAP OF THE UNITED STATES.—Considerable progress has been made in the construction of the topographic map of the United States by the Geological Survey under the direction of Major Powell. Surveys have been completed in Massachusetts, Rhode Island and New Jersey, and partially made in Pennsylvania, New York, Connecticut, Maine and New Hampshire. The maps of the first three named States are partly engraved; that of Massachusetts will comprise fifty sheets, that of Rhode Island fifteen, and the New Jersey map about fifty. The sheets measure thirteen by seventeen and one-half inches. The scale is one mile to the inch. It is proper to add that the expense of the surveys in these three States has been borne equally by the States and the United States.

The law establishing the Geological Survey of the United States authorized and directed the construction of a geological map, but made no special provision for a topographic survey. The inception of this great work therefore grew out of the necessities of the Geological Survey for geographic maps as a basis for geologic cartography, and since the commencement of the operations of the Survey, or, for the past ten years, a portion of the annual appropriations has been expended in making geographic surveys. In the law passed at the last session of Congress making appropriations for

the expenses of the geological survey, the topographic survey is for the first time distinctly and separately recognized, viz.: "For topographic surveys in various portions of the United States . . . two hundred thousand dollars," being double the amount appropriated by the same act for geologic surveys.

The atlas of the whole country will comprise about 2600 sheets, of the dimensions already described. Maps of most of the northeastern portion of the country will be made on the scale of one mile to the inch, and engraved on sixteen sheets to a square degree; the central and southern portions and Pacific slope on a scale of two miles to the inch, and four sheets to a square degree; the thinly settled regions of the Great Basin, the Rocky Mountains, the high Sierras and the plateau country drained by the Colorado River on a scale of four miles to the inch, and one sheet to a square degree. The square degree is one degree in latitude by one degree in longitude.

The sheets are engraved on copper, three plates being required for each. On the first is engraved the hydrography, that is to say, coast lines, lakes, ponds, rivers, and on large scale sheets all springs and running streams. PRINTED IN BLUE. On the second plate the hypsography—the relief of the surface. The method of contours or grade curves has been adopted as best representing this condition of the earth's surface. The contour interval ranges from ten feet in level country and upon maps of the larger scales to two hundred and fifty feet in the smallest scale maps. PRINTED IN BROWN. On the third plate are engraved the projection lines, lettering, public culture, legend, title, etc. By "public

culture" are meant those features of the surface of the earth due to the activity of communities, such as civil divisions, railways, canals, public works, etc., as distinguished from boundaries of estates, private roads, single houses, etc., which constitute private culture. PRINTED IN BLACK.

ALASKA BOUNDARY.—In the treaty of 1867, ceding the Russian possessions in North America to the United States, the eastern limit of the territory is declared to be "the line of demarcation between the Russian and British possessions in North America, as established by the convention between Russia and Great Britain of February 28, 1825," and described in articles iii. and iv. of said convention in the following terms;

III. The line of demarcation between the possessions of the high contracting parties upon the coast of the continent and the islands of America to the northwest shall be drawn in the following manner: Commencing from the southernmost point of the island called Prince of Wales Island, which point lies in the parallel of 54° 40′ north latitude and between the 131st and 133d degree of west longitude (meridian of Greenwich), the said line shall ascend to the north along the channel called Portland Channel, as far as the point of the continent where it strikes the 56th degree of north latitude; from this last mentioned point the line of demarcation shall follow the summit of the mountains situated parallel to the coast, as far as the point of intersection of the 141st degree of west longitude; and, finally, from the said

point of intersection, the said meridian line of the 141st degree, in its prolongation as far as the frozen ocean, shall form the limit between the Russian and British possessions on the Continent of America to the northwest.

IV. With reference to the line of demarcation laid down in the preceding article, it is understood: 1st. That the island called Prince of Wales Island shall belong wholly to Russia. 2d. That wherever the summit of the mountains which extend in a direction parallel to the coast, from the 56th degree of north latitude to the point of intersection of the 141st degree of west longitude, shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia, as above mentioned, shall be formed by a line parallel to the windings of the coast, and which shall never exceed the distance of ten marine leagues therefrom.

It is admitted that the language of the treaty, in so far as it attempts to define the boundary of the southeastern portion of Alaska territory—the valuable part of that region, then Russian America—is, from the modern standpoint, not precise enough to render misunderstanding impossible. The boundary specified was formulated on a mistaken assumption as to facts, and is impossible to determine by survey.

It was during the sessions of the Fisheries Conference in Washington in 1887–'88, that it was suggested that an informal consultation between some person in this country possessing knowledge of the questions in dispute, and a Canadian similarly equipped, might tend

to facilitate the discovery of a basis of agreement between the United States and Great Britain upon which a practical boundary line could be established. To this intent Mr. William H. Dall, of Washington, and Dr. George M. Dawson, of Canada, submitted to the late Secretary of State the results of several conferences held at the instigation of the Department.

The opinion of Mr. Dall, which to this extent is concurred in by Mr. Dawson, is, that a point be determined on each of the four passage-ways into the interior—Chilkoot, Taku and Stikine Rivers and Portland Canal—at ten marine leagues distance from the coast. Let the territory drained by branches coming into the rivers seaward by this point (to be shown by a permanent monument) belong to the United States; that drained by streams coming in eastward of the monument, to be British. The boundary would follow the water parting between the two.

At Portland Inlet and at the head of Lynn Canal the divide between the interior and coast water-sheds should form the line. Provided that in the event of the boundary line reaching a certain specified distance from the coast, it shall then follow a straight line with a prescribed course for such distance as the seaward streams may be found to lie on the British side of said line. This would reduce the positions requiring careful astronomical determinations to three, namely, the inception of the boundary line at the head of Portland Inlet and the two monuments on the Taku and the Stikine respectively. The strip of country between the 141st meridian and the head of the Chilkat River, which is inaccessible from the coast except by way of the Atna

and Chilkat Rivers, might be settled by taking the summit of the St. Elias Alps (everywhere visible from the ocean, though not yet reached or scaled by any man) which could be united by a set of great triangles from the head of the Chilkat and along the coast of the Pacific from Fairweather Peak to Mount St. Elias.

Meanwhile the Superintendent of the United States Coast and Geodetic Survey has selected Mr. J. E. McGrath, sub-assistant, as chief of a party to make a preliminary survey of the frontier line between Alaska and British Columbia along the 141st meridian of west longitude at or near where it crosses the Yukon River. The survey is made at the original instance of the Department of State, and the data and maps resulting from it are designed to be used by the Government in negotiation, adjustment and definite settlement and location of the boundary, whether by correspondence, commission or other agency. The general character of the survey is indicated in the following: "A plan or project for accurately and permanently locating in latitude and longitude points in Southeastern Alaska for the determination of a line not to exceed the distance of ten marine leagues from the coast-line, said points to be accessible respectively by the Portland Canal, the Stikine River, the Taku River and the Chilkat and Chilkoot Rivers, with such other points as may be found to be accessible by the Coast Survey parties in Southeastern Alaska; and also points on the Yukon and Porcupine Rivers at or near the 141st meridian of west longitude and such other accessible points along or near said meridian, as it may be deemed by the Superintendent of the Coast and Geodetic Survey, advisable to so

locate; such points to be marked by such permanent marks or monuments as may be available; and that in the vicinity of such points such rapid topographical reconnaissance or work shall be done as may be practicable and as may serve to identify and reasonably delineate the characteristics of the country, so as to enable a boundary commission or other negotiators of a boundary treaty to agree upon a boundary of straight or other intelligible and easily-defined lines. The results of the field-work thus outlined to be reduced and made available for use in the definition and adjustment of the boundary, by publication in proper and convenient map or maps, supplemented by such report by the Superintendent of the Coast and Geodetic Survey as may be necessary to explain any points not rendered clearly apparent by such map or maps."

The surveying parties for the Yukon and Porcupine Rivers were expected to embark early in June from San Francisco, in vessels provided by the Alaska Commercial Company, under an agreement to transport the parties and outfit by the way of St. Michaels and the Yukon River, to the vicinity of Belle Isle or Forty Mile Creek, and near the crossing of the Yukon River by the 141st meridian, or as near to it as they can possibly get with their steamers.

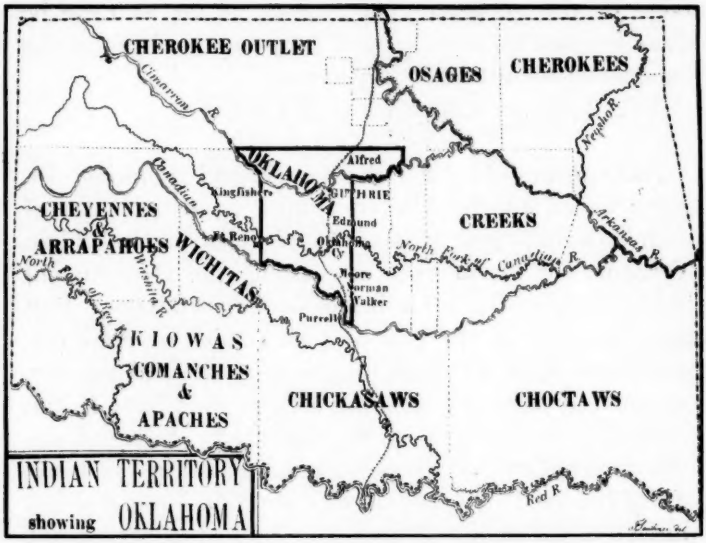
In his instructions Chief McGrath is advised that "Next in importance to the establishment of the points where the 141st meridian passes the watercourses, is the desirability of collecting as much geographical and other information as possible concerning the region. Outside of the establishment of points on Yukon and Porcupine gather information as far as possible in a

practical form, and make notes and observations copious, bearing always in mind that one object of the expedition will be to verify and correct our present knowledge of the geography of Alaska as far as it can be done without interfering with the primary object of the expedition for the boundary survey."

This is the present status of this matter.

OKLAHOMA.—In 1866 the Creek and Seminole Indians ceded to the United States 5,439,843 acres of their domain (equal to 8500 square miles) in the Indian Territory for the purpose of enabling the Government to locate thereon other tribes of friendly Indians. Portions of land on the east and west sides of these cessions have been set apart for this purpose, and are now occupied by several tribes, but a large tract lying in the middle has never been so appropriated. It is this unappropriated and unoccupied land situated in the heart of the Indian Territory that has been declared to be a portion of the public domain, and opened to settlement by proclamation of the President of the United States, dated March 23d, 1889. It comprises about 1,900,000 acres—equal to an area about one-third larger than the State of Delaware. It is bounded on all sides by the Indian Territory, but its position may be defined by the Canadian River on the south; by the 98th meridian and Cimarron River on the west; by latitude 36° 11′ on the north; and on the east by longitude 97° 15′, the Cimarron River and, for a short distance, longitude 96° 50′. No territorial government has been provided, nor has the name Oklahoma been recognized by any statutory enactment, but only by common consent.

The Act of Congress which provides for the segregation of this domain is found in sections 12, 13, 14 and 15 of an Act making appropriations for the current



and contingent expenses of the Indian Department, and for fulfilling treaty stipulations with various Indian tribes for the year ending June 30, 1890. Approved March 2, 1889. As follows:

SEC. 12. That the sum of one million nine hundred and twelve thousand nine hundred and forty-two dollars and two cents be, and the same hereby is, appropriated, out of any money in the Treasury not otherwise appropriated, to pay in full the Seminole Nation of Indians for all the right, title, interest, and claim which said nation of Indians may have in and to certain lands ceded by article three of the treaty between the United States and said nation of Indians, which was concluded June fourteenth, eighteen hundred and sixty-six, and proclaimed August sixteenth, eighteen hundred and sixty-six, and which land was then estimated to contain two million one hundred and sixty-nine thou-

sand and eighty acres, but which is now, after survey, ascertained to contain two million thirty-seven thousand four hundred and fourteen and sixty-two hundredths acres, said sum of money to be paid as follows: One million five hundred thousand dollars to remain in the Treasury of the United States to the credit of said nation of Indians and to bear interest at the rate of five per centum per annum from July first, eighteen hundred and eighty-nine, said interest to be paid semi-annually to the treasurer of said nation, and the sum of four hundred and twelve thousand nine hundred and forty-two dollars and twenty cents to be paid to such person or persons as shall be duly authorized by the laws of said nation to receive the same, at such times and in such sums as shall be directed and required by the legislative authority of said nation, to be immediately available; this appropriation to become operative upon the execution by the duly appointed delegates of said nation, specially empowered so to do, of a release and conveyance to the United States of all the right, title, interest, and claim of said nation of Indians in and to said lands, in manner and form satisfactory to the President of the United States, and said release and conveyance, when fully executed and delivered, shall operate to extinguish all claims of every kind and character of said Seminole Nation of Indians in and to the tract of country to which said release and conveyance shall apply, but such release, conveyance, and extinguishment shall not inure to the benefit of or cause to vest in any railroad company any right, title, or interest whatever in or to any of said lands, and all laws and parts of laws so far as they conflict with the foregoing, are hereby repealed, and all grants or pretended grants of said lands or any interest or right therein now existing in or on behalf of any railroad company, except rights of way and depot grounds, are hereby declared to be forever forfeited for breach of condition.

SEC. 13. That the lands acquired by the United States under said agreement shall be a part of the public domain, to be disposed of only as herein provided, and sections sixteen and thirty-six of each township, whether surveyed or unsurveyed, are hereby reserved for the use and benefit of the public schools, to be established within the limits of said lands under such conditions and regulations as may be hereafter enacted by Congress.

That the lands acquired by the conveyance from the Seminole Indians hereunder, except the sixteenth and thirty-sixth sections, shall be disposed of to actual settlers under the homestead laws only, except as herein otherwise provided (except that section two thousand three hundred and one of the Revised Statutes shall not apply): *And provided further*. That any person who having attempted to, but for any cause

failed to secure a title in fee to a homestead under existing law, or who made entry under what is known as the commuted provision of the homestead law, shall be qualified to make a homestead entry upon said lands: *And provided further*, That the rights of honorably discharged Union soldiers and sailors in the late civil war, as defined and described in sections twenty-three hundred and four and twenty-three hundred and five of the Revised Statutes shall not be abridged: *And provided further*, That each entry shall be in square form as nearly as practicable and no person be permittted to enter more than one-quarter section thereof, but until said lands are open for settlement by proclamation of the President, no person shall be permitted to enter upon and occupy the same, and no person violating this provision shall ever be permitted to enter any of said lands or acquire any right thereto.

The Secretary of the Interior may, after said proclamation and not before, permit entry of said lands for town-sites, under sections twenty-three hundred and eighty-seven and twenty-three hundred and eighty-eight of the Revised Statutes, but no such entry shall embrace more than one-half section of land.

That all the foregoing provisions with reference to lands to be acquired from the Seminole Indians including the provisions pertaining to forfeiture shall apply to and regulate the disposal of the land acquired from the Muscogee or Creek Indians by articles of cession and agreement made and concluded at the city of Washington on the nineteenth day of January in the year of our Lord eighteen hundred and eighty-nine.

SEC. 14. The President is hereby authorized to appoint three commissioners, not more than two of whom shall be members of the same political party, to negotiate with the Cherokee Indians and with all other Indians owning or claiming lands lying west of the ninety-sixth degree of longitude in the Indian Territory for the cession to the United States of all their title, claim, or interest of every kind or character in and to said lands, and any and all agreements resulting from such negotiations shall be reported to the President and by him to Congress at its next session and to the council or councils of the nation or nations, tribe or tribes, agreeing to the same, for ratification, and for this purpose the sum of twenty-five thousand dollars, or so much thereof as may be necessary, is hereby appropriated, to be immediately available: *Provided*, That said commission is further authorized to submit to the Cherokee nation the proposition that said nation shall cede to the United States in the manner and with the effect aforesaid, all the rights of said nation in said lands upon the same terms as to payment as is provided in the agreement made with the Creek Indians of date January nineteenth,

eighteen hundred and eighty-nine, and ratified by the present Congress; and if said Cherokee nation shall accept and by act of its legislative authority duly passed, ratify the same, the said lands shall thereupon become a part of the public domain for the purpose of such disposition as is herein provided, and the President is authorized as soon thereafter as he may deem advisable, by proclamation to open said lands to settlement in the same manner and to the same effect, as in this act provided concerning the lands acquired from said Creek Indians, but until said lands are opened for settlement by proclamation of the President, no person shall be permitted to enter upon and occupy the same, and no person violating this provision shall be permitted to enter any of said lands or acquire any right thereto.

SEC. 15. That the President may whenever he deems it necessary create not to exceed two land districts embracing the lands which he may open to settlement by proclamation as hereinbefore provided, and he is empowered to locate land offices for the same appointing thereto in conformity to existing laws, registers and receivers and for the purpose of carrying out this provision five thousand dollars or so much thereof as may be necessary is hereby appropriated.

The country is described in general terms as a vast plain with gradual slopes towards the East, and is drained by the Cimarron and Canadian Rivers, which traverse the territory from the West to the East. The temperature averages from 50° to 60°, atmosphere dry, altitude about 1000 feet. The land is good, said to surpass that of the States: timber abundant. A division of the Atchison, Topeka and Santa Fé Railroad runs through the whole length of the territory, a little eastward of a line drawn through the centre.

The bill to provide for the organization of the Territory of Oklahoma (known as the Springer bill) which failed to pass both houses of Congress at the last session, carved out a territory of much larger extent, to wit: all that part of the Indian Territory west of the lands occupied by the five civilized tribes (the Cherokee, Creek, Seminole, Choctaw and Chickasaw), and also what is

known as the Public Land Strip, lying north of Texas, east of New Mexico, south of Colorado and Kansas, and west of the Indian Territory. The land embraced within its limits contains 23,267,719 acres, an area equal to that of the State of Indiana. This bill was abandoned chiefly for the reason that the grotesque clamor for Oklahoma lands precluded the possibility of allowing sufficient time for further negotiations with the Indian tribes, in order to arrange for compensation for diversion of the lands from the purposes set forth in the treaty of 1866, and to settle conditions of removal of the tribes already located; for, as has been already observed, the Cherokees and Seminoles ceded these lands to the United States by treaty in 1866 for the declared purpose, *and for no other* than that of settling thereon friendly Indians and freedmen. The substitute measure agreed upon late in the session and made part of the Indian Appropriation bill was considered the most effectual disposition of the question for the present. But nothing is more certain than that, in the near future the larger area will be included, the Indians removed, and a territorial government provided.*

PARAGUAY.—The latest official accounts† from Paraguay amplify, to a considerable extent, our previous knowledge of that interesting country. The northwest boundary of the western division, or the Gran Chaco,

* There can be but one opinion concerning the action of Congress; and if anything could add to its iniquitous character it would be the fact that the spoliation was planned in full view of the preparations for celebrating, as a national solemnity, the hundredth anniversary of Washington's inauguration as the first President of the Republic.

GEO. C. HURLBUT.

† F. D. Hill to the Department of State. Dated, Asuncion, January 23, 1889.

as it is called, which is a vast and unexplored country, is still undetermined, the Bolivians and Paraguayans disputing the proper location of the line. Until recently the Chaco has been considered to be an uninhabitable waste, but within the last two years the lands have risen enormously in value. A concession has been granted to a company of capitalists for the construction of a railway from Asuncion through the Chaco to Sucre, Bolivia, a distance of 600 miles. With this opening of the Chaco to settlement it is not improbable that the part of Paraguay west of the river may in future years prove to be the better part of the country.

Contrary to the opinion which has prevailed in the United States and elsewhere, the climate of Paraguay is declared to be remarkable for its salubrity. Dr. Stewart, British Vice-consul at Asuncion, says: "If the absence of the principal zymotic diseases—yellow fever, typhus and typhoid, cholera and dysentery, which are all more or less endemic, or appear epidemically in Brazil and in the River Plate—has any relation to climate, then that of Paraguay is very higly favored, those diseases being almost unknown here." The range of temperature during 1886 was 99° in January to 45° in June, and in 1888 the thermometer reached a maximum of 97° on six different days.

In the matter of population it has been said that seven-eighths of the inhabitants, or 700,000 out of 800,000 perished during the war of 1865–1870. The present number of inhabitants may be set down at about 300,000. Asuncion has a population of 25,000. It supports five daily morning papers which, however, appear on the previous evening. The whole country has

eight hundred and forty-one business houses, owned mostly by foreigners; but there is not a British house among them, Four hundred and fifty new houses were erected in 1886, and more in 1887. Ordinary houses rent for $100 per month.

The illiteracy of the people is frightful, only about fifteen per cent. being able to read and write. But to-day education is compulsory in all parts of the Republic. There are now one hundred and thirty-eight schools, with an enrollment of 15,180 scholars; and a normal school training system has been established under an energetic teacher from the United States.

In 1877 the sum of $158,459 was expended by the Government for purposes of education, and by a law passed the same year the following sums are devoted to the same purpose: (1) the sum voted in the general tax; (2) ten per cent. of the product of the public lands and *yerbales* (plantations of maté); (3) an additional three per cent. as soon as the amortization of the interest debt is complete; (4) the fines in general; (5) the product of the vacant inheritances, successions, etc.; (6) one-half the proceeds of judicial sales; (7) a tax of one dollar upon each male over twenty-two years of age domiciled in the Republic. A national college is located at Asuncion.

The home debt of the Republic on the first of January, 1888, was $1,068,891, and the foreign debt was $14,952,097. But of the latter sum $12,945,334, being claims of the Argentine Republic and Brazil, will probably never be paid. The growth of the revenues since the close of the war has been from $102,000 in 1870 to

$3,056,093 in 1887. The total expenditure in 1887, was $1.400,503, including interest.

The value of imports and exports (about equally divided) for 1887 was $4,447,726, an increase over 1886 of $1,184,215. Forty-eight per cent. of the imports came from Great Britain. With the exception of a few agricultural implements and a little lumber, none of the imports came from the United States, the American flag being substantially unknown in that part of the world.

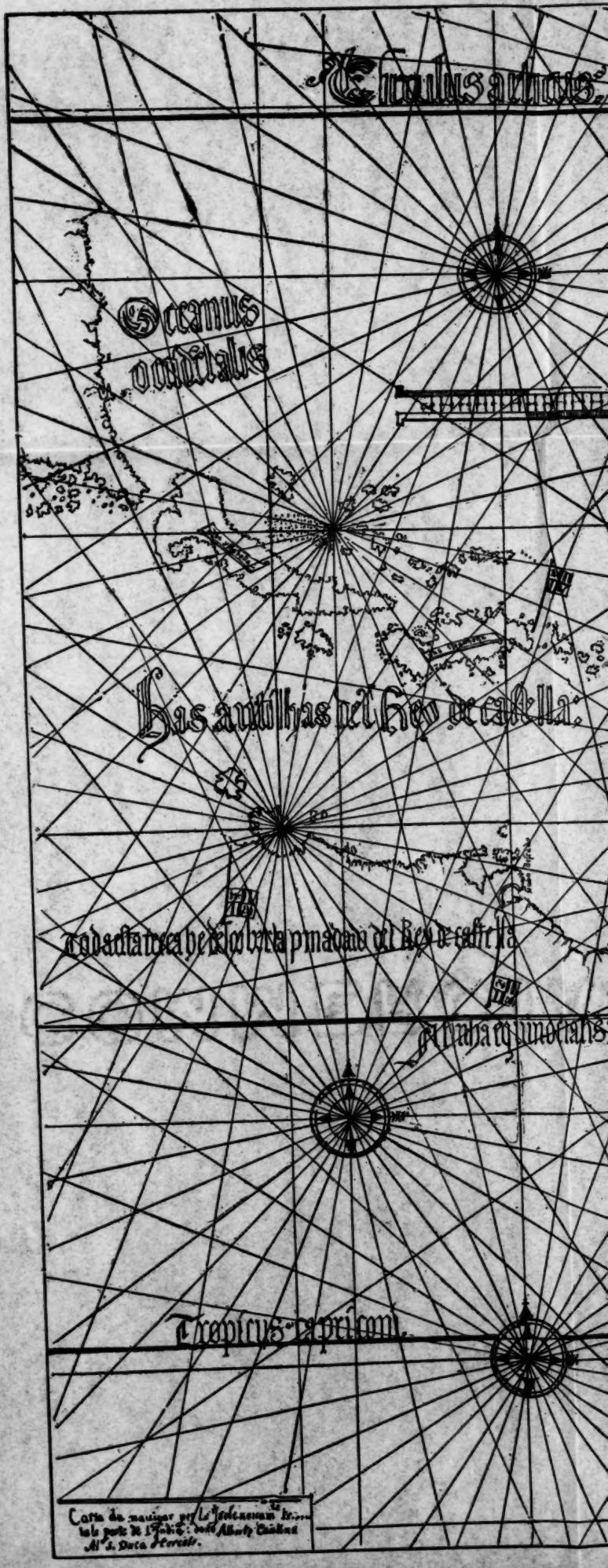
The railroad from Asuncion to Paraguari, commenced in 1861, and the first line constructed in South America, will be completed to Villa Rica this year. The number of passengers carried last year was 257,688. In 1881 the total number was 81,807. The revenue from the post-office has increased from $1,872 in 1880 to $12,257 in 1887. There are two lines of telegraph, both under government control, one of them connecting Asuncion with the outer world. The service is said to be poor. Two new lines are about being constructed. Five years ago there were no banks. To-day there are five, all located in Asuncion. They issue circulating notes, which constitute the chief currency of the country.

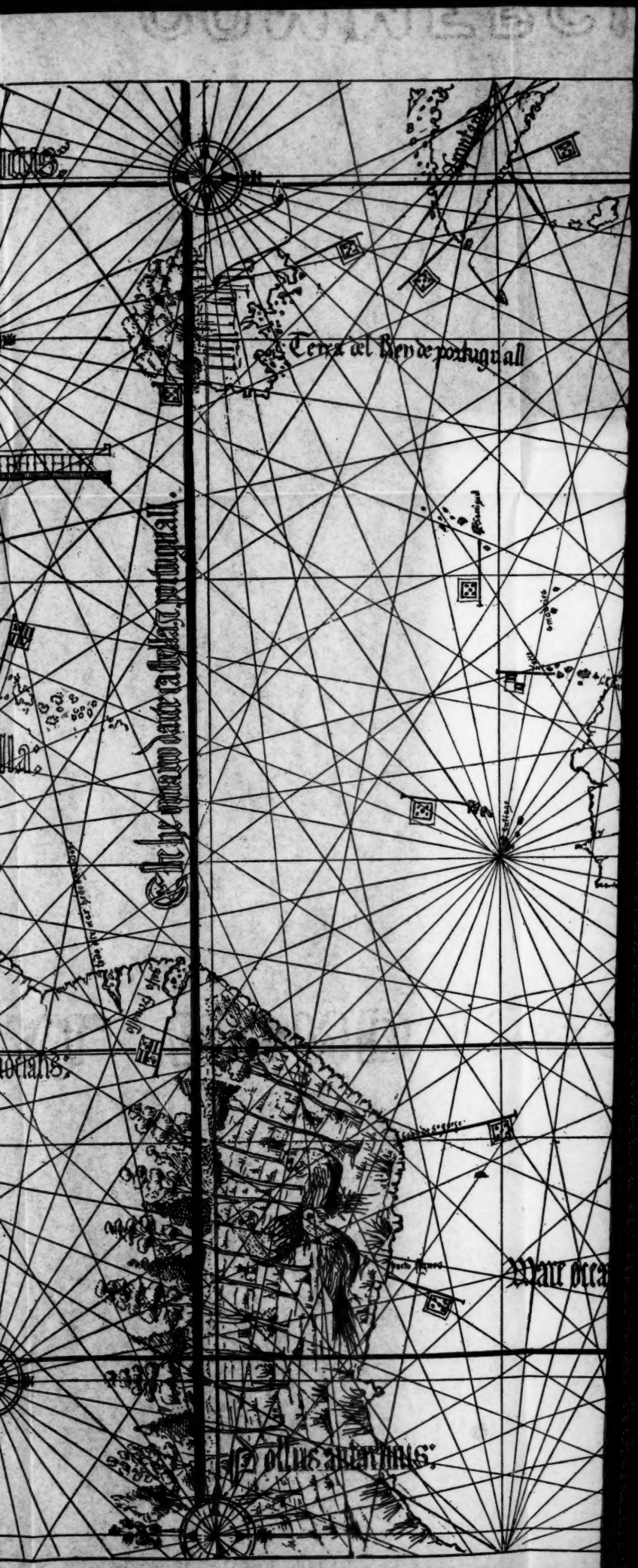
The tide of immigration is beginning to set in towards Paraguay with considerable force. At present there are three colonies. That of San Bernardino on the border of Lake Ipacanai numbers about six hundred inhabitants, mostly German. It has about nine hundred acres in cultivation. That at Villa Hayes (named in compliment to President Hayes) on the Paraguay, numbers about four hundred inhabitants, mostly French. It has about three hundred and twenty-eight acres in cultivation. The Nueva Germania colony is on the Aguaray-

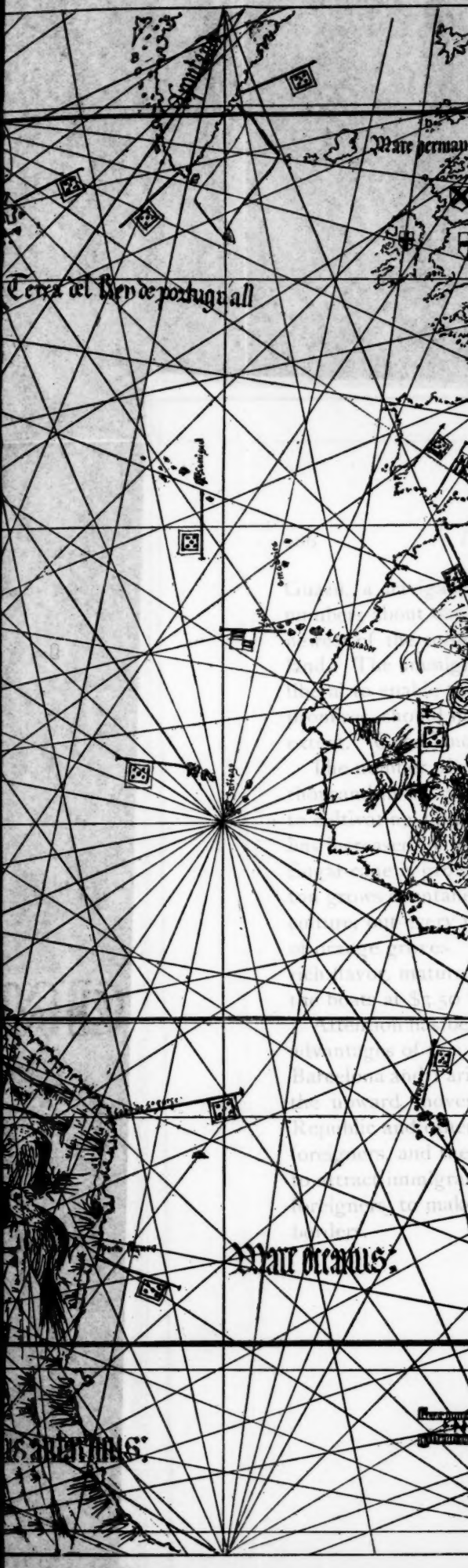
Guazú, a navigable affluent of the Jejuy River. It numbers about one hundred, mostly German. It is the newest of the colonies and possesses twelve leagues of land. The immigration laws are liberal, probably too liberal to enable the Government to fulfil its pledges and promises, should immigration set in to any considerable extent. Good land can be bought for $1.25 per acre.

The number of cattle has increased over six hundred thousand in ten years, but little or no attention is paid to cultivating breeds. The value of exported tobacco has increased in five years from $286,759 to $582,408. Sugar-cane is grown in all parts of the country, and cotton grows spontaneously. There is no intelligent fruit culture, but every town is buried in the luxuriant foliage of orange groves. The fruit, which is of large size and rich flavor, matures in April, and is delivered on board the boats at $3.50 for 5000.

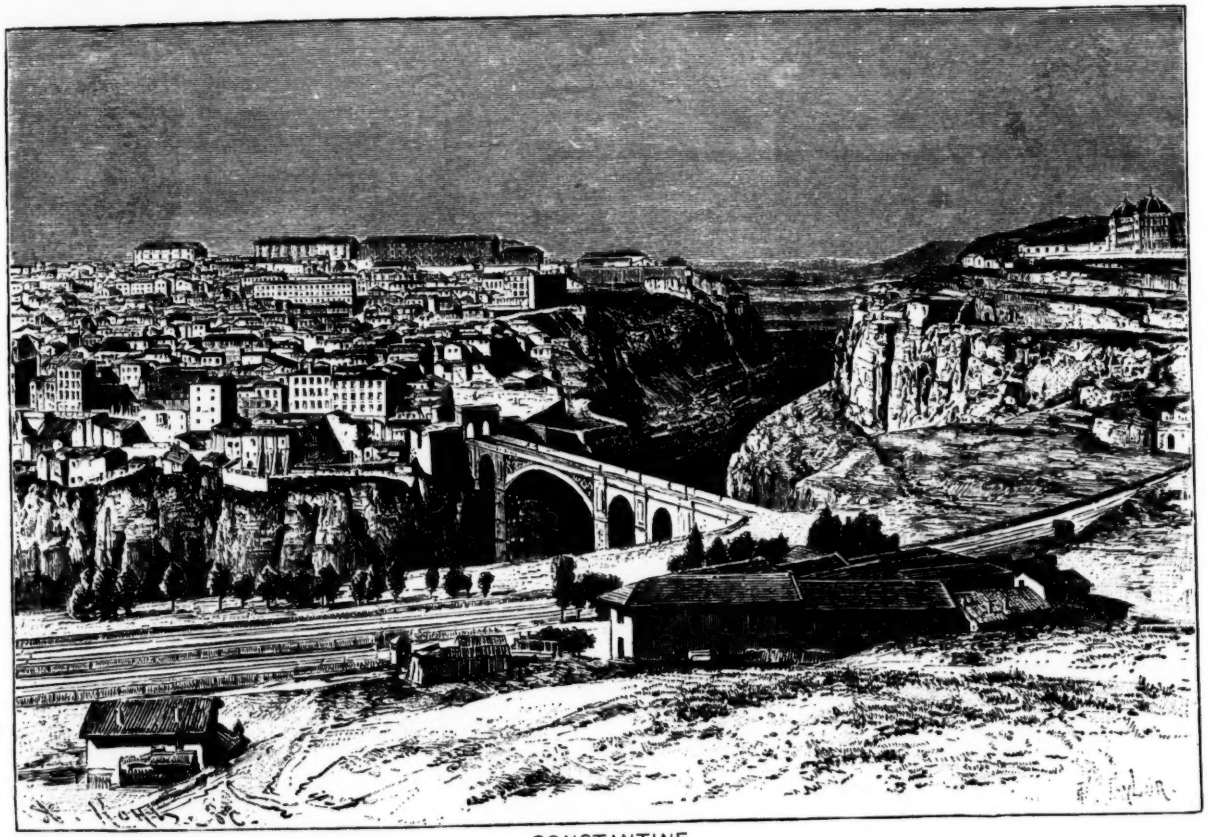
Attention has been drawn to the resources and natural advantages of this country by means of its display at the Barcelona and Paris Exhibitions. As Mr. Hill remarks, the upward movement in Chili, Peru, the Argentine Republic and other South American countries is due to foreigners, and the future of Paraguay lies in its ability to attract immigration to its fertile lands, and to induce foreigners to make their permanent homes within its borders.


Oceanus
occidentalis
Las antillas del Rey de castella
Tropicus capricorni


Terra del Rey de portugall


Mare hermay
Terra del Rey de portugu all
Mare oceanus.

Parte dafrica.
MARE GERMANICVM
Os montes claros em africa.
Cerralhoa
Castello damina.



From E. RECLUS, Nouv. Géog. Universelle.

CONSTANTINE.